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THE USE OF 300 KILOVOLTS IN DEEP X RAY THERAPY: SOME PERSONAL EXPERIENCES.[1]

By A. T. NISBET,
Sydney.

PART I.

THE first part of this paper deals with experiences in organizing and running a modern high voltage deep therapy department and the difficulties that may be experienced. The second part is the result of having overcome these difficulties to a great extent, and the result of attempts to invade what was to me the unknown scientific field of voltages above 200 kilovolts, and the reactions thus obtained in the human body. Once the apparatus was installed, the necessary staff to run the department had to be considered. At first only one technician was employed, but within twelve months the amount of work became far too great for one, and a second technician was appointed.

International regulations regarding protection and working hours are strictly observed. At the Royal Prince Alfred Hospital the first shift of the day commences at 7 a.m. and finishes at 2 p.m. The second technician comes on duty at 1 p.m. and works till 8 p.m. Five days a week are worked, the whole of Saturday and Sunday being free. At Sydney Hospital the daily hours are slightly different, and at this institution the personnel of the deep X ray department now includes: (i) Honorary Radiotherapist, (ii) Assistant Honorary Radiotherapist, (iii) Radium Registrar (resident), (iv) a nursing sister (fully trained), (v) two X ray technicians, (vi) a nurse (trainee), (vii) a typist.

Of these the senior honorary radiotherapist attends two and the junior one afternoon a week to

[1] Read at the Sixth Australian Cancer Conference, Canberra, May, 1935.

examine patients both before and after treatment, and generally to supervise the running of the department. No beds have been alloted to the honorary medical staff of this department, and so far it has not been found necessary to ask for them. Any patients in the wards requiring deep X ray therapy have been allowed to remain in beds under the care of the referring physician or surgeon, and as long as these good people will permit this, it seems that the arrangement will work very satisfactorily.

The Radium Registrar, who is a senior resident medical officer of the hospital, not only assists the honorary officers of the X ray department, but also those who employ radium. This officer has charge of all the radium in the hospital and also looks after records. The name of "radium registrar" is thus rather a misnomer; and some such term as "registrar for radiotherapy" would be more suitable.

The nursing sister assists in both radium and X ray therapy, as also do the nurse and typist. The advantage of having radium and X ray therapy combined under the one roof and being associated together in a large public hospital cannot be overestimated. Quite apart from the saving in time and labour, it seems only right that these two sections of medicine, so closely allied one to the other, should work together. Gynæcological, dermatological and many other patients requiring both radium and X ray treatment attend the same department of the hospital, either for treatment or observation, and the consequent discussions between the various medical officers make for increased interest.

The typist is very fully occupied. The Commonwealth case sheets are all typed not only with the original history of the patient, but also with any subsequent examinations. An index of follow-up cards is kept, and patients are communicated with by post or otherwise. In the compiling of records for the Commonwealth Department of Health the radium registrar and the typist take a tremendous amount of work off the shoulders of the honorary officers; and these records are kept not only for those attending the deep X ray clinic, but of every patient that passes through this section of the hospital, including all patients, surgical, gynæcological *et cetera*, that have had any form of radiation therapy.

The Consultative Committee comprising medical men from the various sections of the hospital meets once a week. To this committee are referred patients from in-door and out-door staff for decision, not only as regards the best form of treatment, but very often for opinion as to diagnosis.

There is no doubt that a tribunal such as this is of help to everybody concerned, practitioner and patient. The three teaching hospitals in Sydney all have these weekly consultations. The clinical discussions that take place over obscure and out of the way cases are assuredly most educative and instructing.

The number of patients treated *per annum* in a deep X ray clinic depends very considerably on the technique used. The higher voltage lessens the period of treatment, but the increased filtration prolongs it. Apparatus with which higher kilovoltage is used can at present work only at reduced milliampèrage. If an X ray tube were available that could be energized at say 300 kilovolts and 25 milliampères, a much higher filtration of copper could be used, because the period of time taken to deliver the required dose would still be within the biological limits; or if the present filter were still thought sufficient, a greater number of patients could undergo therapy. That is to say that the diminution in the rate of mitosis would not have occurred before the necessary number of units were delivered to the growth.

The figures from the three public hospitals which have deep X ray apparatus installed are as follows:

Sydney Hospital, July 1, 1933, to June 30, 1934—	
Number of patients treated	323
Total number of treatments given ..	3,700
Attendances other than treatment ..	900
Total number of attendances for year	4,600
Royal Prince Alfred Hospital, July 1, 1933 to June 30, 1934—	
Number of patients treated	692
Total number of treatments given ..	6,600
Attendances other than treatments ..	2,435
Total number of attendances for year	9,035
Saint Vincent's Hospital, March 31, 1934 to April 30, 1935—	
Number of patients treated	356
Total number of treatments given ..	4,103
Attendances other than treatments ..	1,060
Total number of attendances for year	5,519

During the period under review it must be realized that Sydney and Saint Vincent's Hospitals were working with only one technician, whilst Royal Prince Alfred Hospital had for over twelve months two technicians in employment. It appears that with modern technique requiring a greater length of time for the treatment of each patient, about 700 patients a year is practically the limit with which the present type of deep X ray plant is able to cope.

The average number of treatments given to a patient in each case works out from nine to ten. However, the conditions treated include not only deep seated tumours, but a number of skin lesions where possibly one or two attendances have been all that was required. So that to the people suffering from a deep seated malignant growth the average number of visits would come to somewhere about fifteen or sixteen. Actually the number of treatments given per day when two technicians are employed, averages very regularly between thirty-six and forty.

Finance.

So many inquiries are received from persons interested in other States regarding the cost of running a modern deep X ray therapy department, that it seems advisable to go into this question in some detail.

From the balance sheet published in the annual report for the year ending June 30, 1934, of the Royal Prince Alfred Hospital it is found that salaries and wages paid to deep X ray department (not including nursing staff) were £371 1s. 6d. To this must be added the salary paid to a nursing sister, the cost of electric current, depreciation, maintenance, replacement and repairs. In a letter written to the Medical Superintendent of Sydney Hospital in January of this year, it was mentioned that the annual cost of necessary repairs and replacements could be tabulated thus:

1. One X ray tube—present cost .. .. .. (A modern tube may easily last longer than twelve months, but like an electric light bulb may fail in a much shorter period.)	£260
2. Two valves costing each £48 18s. 0d. (say £50)	100
3. Minor running repairs, say £20	20
Total	£380

Taking then a modern valve rectified plant and having a staff similar to that previously mentioned, the annual expenditure would run out *per annum* something like this:

Resident radium registrar (50%) ..	£200	0	0
Resident nursing sister (50%)	100	0	0
Resident nurse (50%)	25	0	0
Two technicians (each £250 *per annum*)	500	0	0
Typist (50%)	60	0	0
Repairs and replacements as above ..	380	0	0
Depreciation (20% on £3,000)	600	0	0
Interest (5% on £3,000)	120	0	0
	£1,985	0	0

Of the above salaries where only half is debited here, the other half is paid by the radium department. No calculation has been made for rent of premises nor depreciation in buildings. The amount of depreciation allowed on plant (20%) appears high, but there must be taken into consideration that with new discoveries and the amount of research that is going on in different parts of the world, an X ray plant may be out of date at any moment.

Revenue.

Again referring to the Royal Prince Alfred Hospital annual balance sheet (1933-1934), it is found that moneys collected from patients in the deep X ray department itself amounted to £474 8s. 9d. No mention is made of those payments made from the Hospitals Contribution Fund for patients under treatment, nor is there any mention of moneys received from in-patients, nor of payments collected by the accounts branch from persons direct.

In these circumstances one can only compute the revenue received.

With organized methods of collection, I estimate that deep X ray clinics such as the above should receive at the very minimum a thousand pounds *per annum*. This then leaves a debit balance of a thousand pounds a year, which after all cannot be considered excessive when it is remembered that there were over nine thousand attendances and nearly seven hundred people treated.

The figures for Sydney Hospital for the period January 1 to December 31, 1934, were, considering the fewer number of patients treated, very similar to those of Royal Prince Alfred Hospital. Three hundred and seventy-nine pounds (£379) were received from out-patients. Again no estimate is obtainable of moneys received from in-patients and other sources.

PART II.

The second portion of this paper deals with a series of experiments and observations made on the deep therapy apparatus installed at Sydney Hospital. Some description of high tension generator, tube and accessories used in these experiments appears to be a necessary introduction.

1. *Apparatus*: To a major extent the apparatus was described at the last Conference.[1] All that is necessary to refer to at present is to say that the transformers, the control cabinet, and the water cooling system are made in Australia. The condensers come from Germany and the valves from Holland. The circuit used is the Villard. The high tension transformer produces 150 kilovolt peak, and charges two condensers each to 75 kilovolt peaks during one half of the cycle.

During the next half of the cycle the high tension transformer and condensers are electrically in series so that the voltage applied to the tube is the sum of that given by the transformer and condenser, enabling a voltage of 300 kilovolt peaks to be applied.

The resultant potential curve applied to the tube terminals rises from zero to a maximum value, and again falls to zero for each cycle of the primary voltage.

The condenser action results in a wave form which from zero to zero occupies greater time than one half the sine curve of the supply voltage, and the period during which there is no voltage across the tube is brief.

Only the upper values of the voltage are effective in producing radiation of sufficiently short wave length to pass through the filters, since the lower voltages generate X rays of long wave length which are absorbed by the filter material.

The voltage curve is less anæmic than that produced by some other circuits, since the applied potential is at a high value for a longer time than with some other forces of pulsating potential. The end result is that a greater intensity and consequently more *r* per minute are produced when using a heavy filter than would be the case if a circuit were used which produced a more anæmic wave form.

It must be recognized that only twenty months have passed since the Sydney Hospital plant was installed, in June, 1933, and it has taken, of that period, just twelve months to work gradually up from 200 to 275 kilovolts, not because there was any fear that the apparatus might be damaged, but rather because of the lack of information of the effect these higher voltages might possibly have on

the patient. The question of filtration, voltage, time and the dose in *r* delivered to the skin of the patient had all to be considered at one and the same time; and therefore routine work was commenced at 200 kilovolts because one had some years of experience in observing results clinical and biological, obtained on other plants under these conditions.

2. *Tube*: A three-hundred kilovolt peak water-cooled Coolidge (General Electric Corporation) tube at Sydney Hospital operates at a constant current of five milliampères. Two other similar types of apparatus are operated at ten milliampères.

3. *Water Cooling System*: The water cooling system is so constructed that if the pressure of water fails, the main primary current to the transformer is immediately cut off. Also, a thermostatic device acts in a similar manner if the heat of the water rises above a certain temperature. The thermostat operates at present at 38·9° C. (102° F.). Only on the hottest day of summer 1933-1934 whilst running at ten milliampères (which is not usual) for 20 minutes, did the temperature of the water rise to 38·9° C. The ordinary running temperature of the water working at 200 kilovolts and five milliampères is 32·2° C. (90° F.). On increasing the voltage to 230 kilovolts the water temperature rose to 37·2° C. (99° F.), and when 250 kilovolts was reached the thermometer in the water registered 38·3° C. (101° F.). No trouble has been experienced with the water cooling system.

4. *Dosimeter*: The dosimeter used is a Hammer (Baden) which was calibrated against the standard instrument at the University of Sydney and found to be correct at the time these experiments were made.

5. *Spectrometer*: The spectrometer is of the Seemann type. The readings were made by Dr. W. H. Love, of the Cancer Research Committee. They were taken at many different voltages. It is generally recognized that many machines are producing a lower kilovolt peak than the voltage measuring instruments would appear to indicate. In some cases the only equipment for the measurement of kilovolt peak is a sphere gap. If the spheres are used to make a large number of readings under ideal atmospheric conditions, a considerable proportion of such readings will be of a low order, and these readings are probably a better indication of the kilovolt peak than other readings of higher value. Quite apart from the fact that the lower values of sphere gap readings appear the more accurate, it seems that further verification of this occurs in some types of mechanically rectified equipment, and is given by the time taken for this type of apparatus to give out any given number of *r*. It is unlikely that inefficiency of the equipment in other respects could account for the variation. In the case of Sydney Hospital the vertical spark gap has 25 centimetre spheres. It was found to be a very reliable guide to voltage when one did not wish to take up a physicist's time on spectrographic records.

Taking the mean of a number of sphere gap readings, at no time was there an error of more than ten kilovolts compared with the spectrograph. This was very gratifying because daily tests could be made regarding the kilovolt output. The maximum percentage of error in sphere gap calibration was thus less than *plus* or *minus* 5%. The actual spectrographic readings taken by Dr. Love are shown in Table I, and compared with readings on the voltmeter corresponding to sphere gap voltages. All readings were taken at five milliampères.

TABLE I.

Sphere Gap Kilovoltage.	Spectrograph Kilovoltage.
200	205
250	245
300	300

Similar tests were made at the Royal Prince Alfred and Saint Vincent's Hospitals, and Table II shows the variation between sphere gap and spectrographic readings on these two units.

TABLE II.

	Sphere Gap Kilovoltage.	Spectrograph Kilovoltage.
Royal Prince Alfred Hospital	210	190
Saint Vincent's Hospital	200	185

This question of "effective" *versus* peak voltages is brought home very forcibly by the remarks of Mr. Strong to the Christchurch Hospital. He says that the plant "is fundamentally impossible of supplying a high voltage (and hence an X ray beam) of a character or value suitable for, and efficacious in, the treatment of any but superficial and semi-superficial conditions".

The plant at Christchurch is similar to the one in use at Saint Vincent's Hospital in Sydney, and no mention is made of any possibility of making the Christchurch plant more efficient by employing extra filtration, and increasing the voltage given out by the transformer. The time of treatment may be longer, but that is the sum and substance of Coutard's work.

Mr. Strong seems to have upset New Zealand by his phrase "effective voltage". Candidly I think he is very wrong in upsetting workers. What is the effective voltage of the half million voltage plants used at Pasadena, Chicago and New York? Nothing is said about that large portion of the wave form which is of no effective value because it is cut out by the use of proper filtration. The high peak voltage may be of "extremely short duration", but if that high peak voltage is the only portion of the wave that actually affects the skin and the buried growths, and the other useless portion of the wave is filtered out, what does it matter?

Another way of saying it is that the ineffective rays having been absorbed and only those of any

value allowed to do their work, I fail to see that a plant is fundamentally incapable of supplying the accepted "high" voltage which is necessarily used.

Radiotherapists have understood the wave form of this type of plant and have successfully and efficiently used it, eliminating the portion of the sine curve that is of no value, by the addition of the correct amount of filtration. The number of *r* delivered by the two mechanically rectified plants (Saint Vincent's and the Royal Prince Alfred Hospitals) is certainly much less than that given out by the valve rectified apparatus; but in the former, after spectrometer readings had shown that the voltage was lower than expected (175-180 kilovolts), this was increased until an output of 200 kilovolts was obtained. The small number of *r* delivered per minute, if the voltage output is what it should be, can be accounted for only by the fact that the upper portion of the sine curve is very pointed, and so contains no great volume. The greater part of the curve containing waves of longer length, are prevented from reaching the patient by the amount of filtration used. There is no doubt that the Royal Prince Alfred and Saint Vincent's plants clinically give definite reactions, and are efficient up to the prescribed voltage (even through two and even three millimetres of copper) although it takes an appreciably longer time to obtain the desired results.

After figures regarding dosage times at surface and at depth had been completed with other measuring instruments, there was loaned to the hospitals a new transportable recording instrument "The Victoreen" (Figure I). This is a small instrument

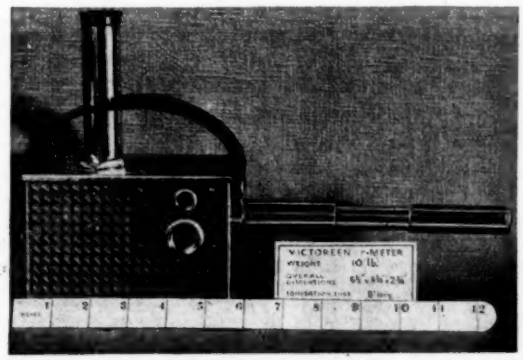


FIGURE I.

having a detachable ionization chamber which is allowed to remain in the X ray beam for one minute. It is then affixed to the recording box, and by the amount of energy discharged shows the number of *r* that have been given off during that period. Dr. Love standardized this instrument against the dosimeter at the university, and found that with unfiltered X rays, beam calculations did not work out according to the makers' specifications; but with adequate filtration interposed, the instrument conformed within 2% of the standard chamber.

The danger of damaging hospital dosimeters by removing them a long distance in order that they may be tested against a standard instrument, is a very real one. Also, after calculations have been made and the apparatus adjusted, it is by no means certain that by the time they arrive back at the hospital, they are giving the same result. The solution of this difficulty, it appears, could be overcome by using a small portable instrument such as the "Victoreen"—thus allowing the hospital dosimeters to remain in their places, yet at the same time allowing them to be correctly calibrated at any time. If it be thought necessary to bring the hospital dosimeters to the standard instrument, then the portable standard would be useful in checking the calibration to prove no damage in transit.

A table of the results obtained using a Hammer and a Mekapion dosimeter as comparing the times in *r* per minute, is as given in Appendix I.

In June, 1934, the Hammer instrument at the Sydney Hospital failed to function, and for nine months we have worked on the time factor only. This time factor has been increased and altered according to the skin reactions. No fatality has occurred, no patient has had an overdose, no filter has been left out, thanks to the care and conscientiousness of the technicians. The reactions have been just what was expected and extreme to a degree.

During the absence of the dosimeter it was found that, in order to obtain the same skin reactions, the time of exposure had to be increased. On the return of the dosimeter, it was found that the increased time had only been sufficient to record the same number of *r* as previously, and it was obvious that, during the period the plant was without its ionometer, something had happened which necessitated a lengthening of dosage time. This after much thought and discussion has been attributed to the installation of a new tube of a different type, although made by the same makers.

The above demonstrates: (i) The advantage of having a measuring instrument continually in operation. (ii) The value of watching at all times the effect of X radiation on the skin, no matter what filter or voltage is being used.

Measurements of Doses Delivered in Air and in a Phantom.

A series of experiments was carried out at Sydney Hospital in the following manner:

An ordinary butter box, $31{\cdot}5 \times 31{\cdot}5$ centimetres inside measurement, with its bottom replaced by one layer of three-ply wood, was filled with 42 pounds of fresh minced beef, containing bone, cartilage, fat and muscle. This was then tightly compressed so that the upper surface of the meat was 20 centimetres from the bottom of the box. This meat, instead of the usual water phantom, was used in order as far as possible to reproduce conditions which obtain in the human body. Thus, if there is any greater secondary radiation given off by any specialized

TABLE III.

Filter (Millimetres).	r.	Milli-ampères.	Time in Seconds.				
			200 Kilovolt Peak.	225 Kilovolt Peak.	250 Kilovolt Peak.	275 Kilovolt Peak.	300 Kilovolt Peak.
		In Air.					
1 copper + 1 aluminium	5	5	20·0	15·0	11·5	9·0	6·5
2 copper + 2 aluminium	5	5	32·0	22·0	17·0	12·0	10·0
3 copper + 2 aluminium	5	5	40·0	27·5	20·0	14·0	11·5
4 copper + 2 aluminium	5	5	52·0	35·0	27·0	18·0	14·0
		Surface of Meat.					
1 copper + 1 aluminium	5	5	17·0	13·0	9·0	7·0	6·0
2 copper + 2 aluminium	5	5	26·0	18·0	12·0	10·0	8·0
3 copper + 2 aluminium	5	5	33·0	22·0	14·0	11·0	9·0
4 copper + 2 aluminium	5	5	45·5	33·0	22·0	16·0	13·0
		Ten Centimetres in Meat.					
1 copper + 1 aluminium	5	5	46·0	32·0	24·0	20·0	16·0
2 copper + 2 aluminium	5	5	82·0	54·0	46·0	30·0	26·0
3 copper + 2 aluminium	5	5	115·0	74·0	45·0	37·0	31·0
4 copper + 2 aluminium	5	5	178·0	113·0	67·0	49·0	40·0

Focal skin distance in above was in all cases 60 centimetres.

tissue such as bone, the components of this phantom, it was thought, would tend to produce a similar effect (Figure II).

A hole was made in the side of the box ten centimetres from the bottom and large enough to admit the barrel of the Hammer dosimeter. This box was then placed in the X ray beam, the port of entry

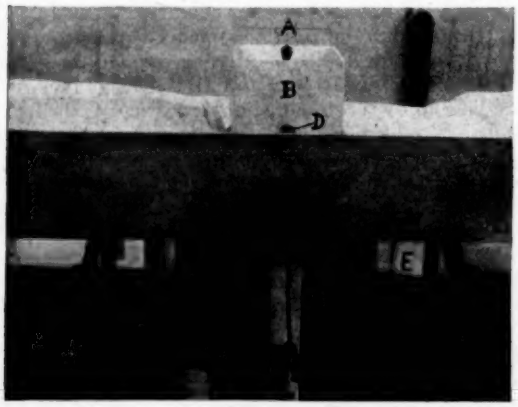


FIGURE II.
A = plumb bob, B = box with meat, C = couch, D = dosimeter, E = X ray tube.

being 24 × 21 centimetres, and measurements were made with the ionization chamber placed between the X ray beam and the surface of the box containing the meat. Later, the port of entry was reduced to 13 × 13 centimetres, and readings were taken with the ionization chamber placed on the surface of the meat and also in at 10 centimetres depth.

The number of *r* per minute registered on the dosimeter was recorded with the following variable factors.

1. Size of port of entry of the X ray beam. The two openings used were, firstly, 24 × 21 centimetres, and 13 × 13 centimetres.

2. Focal skin distance. This was varied from 60 to 70 and then to 80 centimetres, and readings were obtained.

3. Kilovoltage—200, 225, 250, 275 and 300 kilovolts were used.

4. Filtration—one, two, three, and four millimetres of copper were inserted in the filter holder and readings were taken with each.

With all the possible combinations used in these experiments, it will be understood that a very large number of readings had to be made.

The accompanying tables show the variation in time taken to deliver five *r* with the different voltages and filtrations.

Comparing now the times taken to deliver a given dose to the surface to the time necessary to give the same amount at ten centimetres depth, we find the figures set out in Table IV.

TABLE IV.

Filter (Millimetres).	r.	Kilo-voltage.	Time in Seconds.	Situation.
1 copper + 1 aluminium ..	5	200	17	On surface.
1 copper + 1 aluminium ..	5	200	46	At depth.

This means that it takes 2·8 times as long to give the same dose at ten centimetres depth than it does on the skin surface with the above factors. This means that the depth dose is 37% of the surface dose.

Even though the kilovoltage is increased as shown in Table V, it is seen that it still takes 2·7 times as

TABLE V.

Filter (Millimetres).	r.	Kilo-voltage.	Time in Seconds.	Situation.
1 copper + 1 aluminium ..	5	300	6	On surface.
1 copper + 1 aluminium ..	5	300	16	At depth.

long to give the same dose at depth as it does to the surface, equalling 38% at depth.

In Table VI it is seen that it takes 3·9 times as long to give the dose at depth as it does to give it on the surface, equalling 26% at depth.

TABLE VI.

Filter (Millimetres).	r.	Kilovoltage.	Time in Seconds.	Situation.
4 copper + 2 aluminium ..	5	200	45·5	On surface.
4 copper + 2 aluminium ..	5	200	178·0	At depth.

As shown in Table VII it takes 3·1 times as long under the conditions stated to give the depth dose, that is, 33% at depth.

TABLE VII.

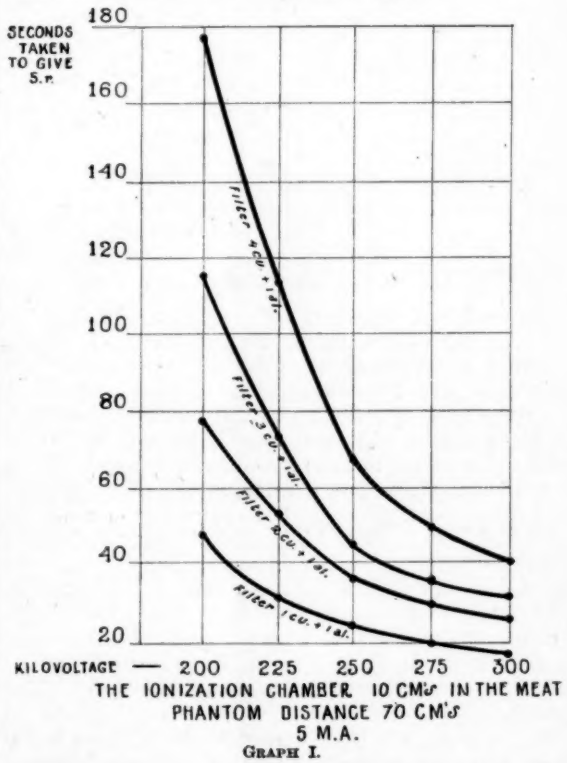
Filter (Millimetres).	r.	Kilovoltage.	Time in Seconds.	Situation.
4 copper + 2 aluminium ..	5	300	13	On surface.
4 copper + 2 aluminium ..	5	300	40	At depth.

Therefore, using one millimetre of copper and increasing the voltage from 200 to 300, we obtain only a 4% increase in the time factor, whereas if four millimetres of copper are placed in site, it is found that by increasing the voltage from 200 to 300, we obtain a 25% increase.

From this I think it can be argued that one obtains a 25% increase in dose to the tumour. Just as important (if not more so) is the fact that a bundle of much shorter wave lengths is being produced, which is more destructive by far to the tumour tissue. This, in transit, does not damage normal cells including those of the epidermis, which previously have been such a worry to the radiologist. Or in other words, by increasing the voltage without increasing filtration, the increase in depth dose is only small. It is necessary to increase the filtration as well as the voltage if the greatest increase in depth dose is to be obtained. It must be remembered that the increased skin tolerance with increasing hardness of radiation greatly increases the depth dose delivered. For example, from VI to VII one gets an increase of 23%, but in addition there is a greater permissible skin dose with higher voltage amounting to 50%.

It may be argued that as long as the internal tumour receives a certain dose, it does not matter whether it is delivered at 200, 250 or 300 kilovolts. It appears, however, that the difference in the type of beam after it has passed through the copper filter has to be examined.

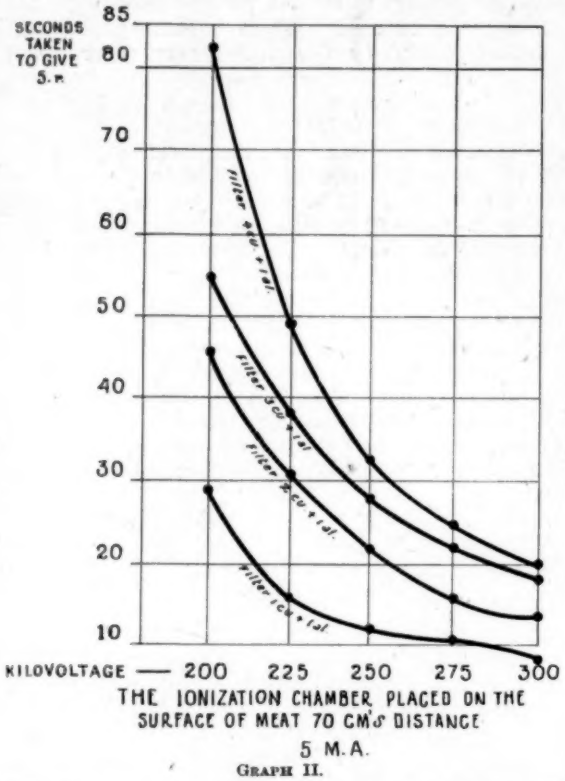
We assume that the beam is more effective at the higher voltage because it contains greater proportion of short waves. Are these shorter waves then of greater therapeutic value than those emitted by a tube activated at a lower voltage? Modern investigators say this is so, and the use of radium *en masse* is thought to be of greater value than deep X rays, on account of the greater number of shorter wave lengths emitted. At the other end of the spectrum we know that the so-called *Grenz* rays have healing properties when applied to superficial lesions of the skin, but are of little or no value for lesions of deeper structures. From these facts it might then be asked, why stop at voltages somewhere about 250 kilovolts? From the experiments performed and the results shown on these graphs it is seen that after a voltage of 275 kilovolts is passed, the curve flattens out so that the percentage increase in the dose delivered is not nearly so great as between 200 and 250 kilovolts (Graphs I, II, III). to 300 kilovolts the quality of the beam emitted is not altered to anything like the same degree as it is between 200 and 250 kilovolts. Unfortunately, although the makers of the plant used in these experiments are willing that it should be worked at a voltage up to 400 kilovolts, there is no tube available at the moment in Australia to withstand this potential. Also, it seems that this experimental work should be carried on by a trained physicist both in a reasearch laboratory, and in the clinical department of a public hospital.



GRAPH I.

From the literature it appears that although this curve flattens out considerably from 275 kilovolts onwards, it again begins to rise somewhere about 500 kilovolts. This means that the X ray beam at these higher voltages is composed of wave lengths which have an increased damaging effect on malignant tissue.

It thus seems possible that there is no great advantage therapeutically in energizing a tube above 275 kilovolts, unless one is prepared to install apparatus and tube capable of delivering something



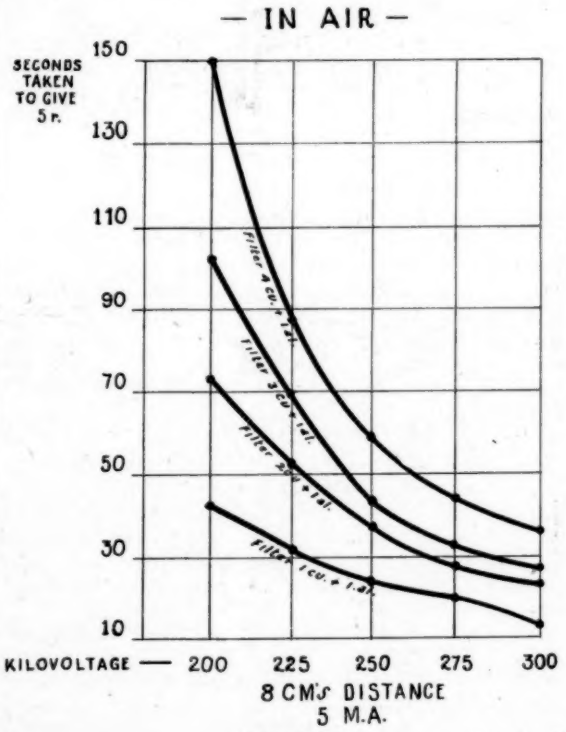
GRAPH II.

well over half a million volts. It is here that the economic position arises, that is, the cost to the private practitioner or public hospital, and the consequent cost to the patient. A year and a half ago the idea of working at the maximum possible voltage that could be obtained, seemed to be the object for which to aim; but since these experiments have been carried out, one feels that enthusiasm for apparatus rated over 300 kilovolts should be checked, unless some philanthropic person, institution or government is inclined to place apparatus of higher kilovoltage at our disposal for research. In a way these figures have been a disappointment, in that it was hoped that the higher the voltage, the proportionately greater the increase in dose; but unfortunately this does not apparently follow after 250 kilovolts. For all that, I am quite satisfied that the increase in voltage from 200 to 275 kilovolts is not only theoretically valuable, but clinically of outstanding importance. It seems that it was by good fortune that the latest plant, delivering 300 kilovolts, was decided upon by the Cancer Research Committee of the University of Sydney, for clinical use. The extra expense in installing a 400 kilovoltage apparatus would apparently have given very little better clinical results.

This is a purely personal deduction arrived at by conclusions drawn from these figures. In the state of our present knowledge, I would suggest that we concentrate on the production of a standard type of apparatus capable of delivering 300 kilovolts, and by this means lower the cost of production, until the members of this conference are satisfied that better results can be obtained from apparatus of a higher voltage.

Originally, when the 300 kilovoltage plants were installed, the moment was anxiously awaited when they would be working at their maximum output and delivering at 300 kilovolts a quality of irradiation unequalled in this Continent. That ambition has had to be somewhat modified as a result of experience. The extraordinary increase in the quality of the X ray beam between 200 and 250 kilovolts gave hopes of still better results at a much higher voltage; but anticipations were not realized.

In air at 200 kilovolts it takes 20 seconds to deliver 5 *r* through one millimetre of copper, and it takes 40 seconds through three millimetres.



GRAPH III.

Now, by placing the meat phantom in position and repeating the above, the effect of back scatter is immediately noticeable. This time, through one millimetre of copper it takes seventeen instead of twenty seconds to give the same 5 *r*, whilst with three millimetres of copper the time is reduced from forty to thirty-three seconds. This shows that by

doing nothing else than increasing the filtration more secondary irradiation is available.

Again in air at 300 kilovolts, the other conditions remaining the same, with one millimetre of copper it takes 6·5 seconds to give 5 *r*, and 11·5 seconds when three millimetres of copper are used.

When the meat is in position, and the ionisation chamber is contact with its surface, the variation in time is not nearly so great as with 200 kilovolts, for it now takes six seconds with one millimetre of copper and nine seconds with three millimetres of copper. The increase in back scatter is apparently very little, but the secondary radiation must be there so that the only way to account for this apparent phenomenon is by realizing that the bundle of wave lengths making up the X ray beam contains many more short waves than at 200 kilovolts; and that they penetrate the three millimetres of copper almost as easily as they do one millimetre. Therefore, it is these short waves by themselves which cause the greater amount of secondary radiation to be given off by the tissues when a low filtration of copper is used. The longer wave lengths do not result in any substantial increase in the back scatter effect.

The unexpected diminution in the percentage of effective wave lengths produced at voltages above 250 kilovolts gave food for serious thought. It has now been decided that as the plants are built at a maximum output of 300 kilovolts, and as the quality of irradiation alters so little between 275 and 300 kilovolts, we should standardize our work at not more than 275; thus underloading the apparatus by 25 kilovolts, and not running the tube to its greatest capacity and ensuring it longer life. For nine months now this has been the working voltage. Five is the standard milliampèrage, and two, three and four millimetres of copper the various filtration necessary according to the clinical requirements. This technique has proved extremely satisfactory, and until further reasons are put forward, there appears no wisdom in changing these methods. Although the dose at depth has been discussed at length, something should be said about the unexpected skin reactions when using these higher voltages and higher filtrations. The word "erythema" cannot be applied. The higher the voltage (within the limits described), and the thicker the filter, so does the redness of the skin diminish.

In 1931 at the Second Australian Cancer Conference, Keatinge and myself[2] attempted to define the various degrees of "erythema", and mentioned that with two millimetres of copper or over it was considered that after a period of fourteen days to twenty-one days a redness of the skin occurred, followed later by an intense pigmentation which arose within a period of two months, and persisted often for many months longer.

With higher voltages and higher filtrations, this definition has been borne out, except that the amount of redness one would expect to find on the skin has not appeared.

The skin remains its normal colour for about four weeks, then a browning commences which may go on to a dense black pigmentation in eight weeks after completion of treatment. Desquamation then starts to occur, and in five to six months the epidermis (if no further radiation is given) has returned to its original state. At no time is there any pain or discomfort beyond sometimes irritation which can be remedied by cold creams or lanoline.

Acknowledgements.

I have to thank Dr. C. E. Eddy, Melbourne University, for his assistance in sub-editing this article, and Dr. W. H. Love of Sydney University Cancer Research Laboratory, for testing certain instruments, and for calculations made at the teaching hospitals, also the medical and technical staffs of these hospitals for their help and cooperation.

Summary.

1. The organization and running of a deep X ray therapy department of a large public hospital is set out, including the necessary staff, medical and technical, the present number of patients treated, the number of treatments given, and the revenue and expenditure over a period of twelve months estimated.

2. The apparatus is described, including the means taken to estimate quantity and quality of X radiation delivered.

3. Dosimeters of three types are discussed and the value of spectrometric and sphere gap readings are evaluated. The necessity for continually having some form of instrument measuring the output from an X ray tube is stressed.

4. The risk of damaging dosimeters that are apparently working well, in transporting them for calibration against an immovable standard instrument, is brought forward. It is suggested that a portable sub-standard should be employed.

5. A meat phantom is described and a method of attempting to estimate the number of *r* delivered in air compared to that delivered on the surface of a patient and at 10 centimetres depth in the body tissue.

6. Certain conclusions are drawn from the above experiments and estimations are arrived at in an attempt to obtain some valuation of increased voltage and increased filtration.

7. It is found that there is an enormous decrease in the time taken to deliver a given dose when the voltage is raised from 200 to 250 vilovolts, but this effect is not nearly so pronounced between 250 and 300 kilovolts.

8. It is put forward that at present, unless it is possible to install machines giving an output of over

500 kilovolts, the best working voltage is round about 275 kilovolts.

9. Also the value of increased filtration up to a certain thickness is again stressed, even with X ray plants delivering a kilovoltage of 200.

10. That the assistance of the physicist and pathologist is necessary in hospital radiotherapy departments is shown, and the opportunities for research work for these scientists are brought forward.

References.

(1) T. Wilkins: "Deep Therapy X Ray Equipment at Sydney Hospital", Report of Fifth Australian Cancer Conference, 1934.
(2) A. T. Nisbet and Leila Keatinge: "Some Observations on the Problem of the Erythema Dose", *The Journal of the Cancer Research Committee of the University of Sydney*, May, 1931.

APPENDIX 1.

1. "Mekapion" (Macquarie Street).—One millimetre of copper + one millimetre of aluminium. 200 kilovolts. 10 milliampères. 100 *r* in 8 minutes at 60 centimetres focal skin distance = 1·8 *r* per milliampère minute at 50 centimetres focal skin distance.

2. "Victoreen" (Macquarie Street).—One millimetre of copper + one millimetre of aluminium. 200 kilovolts. 10 milliampères. 53 *r* in 4 minutes at 60 centimetres focal skin distance = 1·9 *r* per milliampère minute at 50 centimetres focal skin distance.

3. "Victoreen" (Saint Vincent's Hospital).—One millimetre of copper + one millimetre of aluminium. 200 kilovolts. 20 milliampères. 24 *r* at 50 centimetres focal skin distance = 1·22 per milliampère minute at 50 centimetres focal skin distance.

4. "Mekapion" (Macquarie Street).—Two millimetres of copper. 200 kilovolts. 10 milliampères. 37·5 *r* in 4 minutes at 60 centimetres focal skin distance = 1·45 *r* per milliampère minute at 50 centimetres focal skin distance.

5. "Victoreen" (Macquarie Street).—Two millimetres of copper. 200 kilovolts. 10 milliampères. 40 *r* in 4 minutes at 60 centimetres focal skin distance = 1·4 *r* per milliampère minute at 50 centimetres focal skin distance.

6. "Victoreen" (Royal Prince Alfred Hospital).—Two millimetres of copper. 200 kilovolts. 25 milliampères. 18·5 *r* at 45 centimetres focal skin distance = 1·5 *r* per milliampère minute at 50 centimetres focal skin distance.

7. "Victoreen" (Saint Vincent's Hospital).—Two millimetres of copper. 200 kilovolts. 20 milliampères. 15·5 *r* at 50 centimetres focal skin distance = 0·77 *r* per milliampère minute at 50 centimetres focal skin distance.

8. "Mekapion" (Macquarie Street).—Two millimetres of copper + one millimetre of aluminium. 275 kilovolts. 10 milliampères. 65 *r* in 2 minutes at 60 centimetres focal skin distance = 4·68 *r* per milliampère minute at 50 centimetres focal skin distance.

9. "Victoreen" (Macquarie Street).—Two millimetres of copper + one millimetre of aluminium. 275 kilovolts. 10 milliampères. 70 *r* in 2 minutes at 60 centimetres focal skin distance = 5 *r* per milliampère minute at 50 centimetres focal skin distance.

10. "Victoreen" (Sydney Hospital).—Two millimetres of copper + one millimetre of aluminium. 275 kilovolts. 5 milliampères. 17 *r* at 60 centimetres focal skin distance = 4·89 *r* per milliampère minute at 50 centimetres focal skin distance.

11. "Mekapion" (Macquarie Street).—Three millimetres of copper + two millimetres of aluminium. 275 kilovolts. 10 milliampères. 72 *r* in 3 minutes at 60 centimetres focal skin distance = 3·4 *r* per milliampère minute at 50 centimetres focal skin distance.

12. "Victoreen" (Macquarie Street).—Three millimetres of copper + two millimetres of aluminium. 275 kilovolts. 10 milliampères. 80 *r* in 3 minutes at 60 centimetres focal skin distance = 3·8 *r* per milliampère minute at 50 centimetres focal skin distance.

13. "Victoreen" (Sydney Hospital).—Three millimetres of copper + two millimetres of aluminium. 275 kilovolts. 5 milliampères. 15 *r* at 60 centimetres focal skin distance = 4·35 *r* per milliampère minute at 50 centimetres focal skin distance.

14. "Mekapion" (Macquarie Street).—Four millimetres of copper + two millimetres of aluminium. 275 kilovolts. 10 milliamperès. 58 *r* in 3 minutes at 50 centimetres focal skin distance = 2·8 *r* per milliampère minute at 50 centimetres focal skin distance.

15. "Victoreen" (Macquarie Street).—Four millimetres of copper + two milliampères of aluminium. 275 kilovolts. 10 milliampères. 69 *r* in 3 minutes at 50 centimetres focal skin distance = 3·3 *r* per milliampère at 50 centimetres focal skin distance.

16. "Victoreen" (Sydney Hospital).—Four millimetres of copper + two millimetres of aluminium. 275 kilovolts. 5 milliampères. 12 *r* at 60 centimetres focal skin distance = 3·45 *r* per milliampère minute at 50 centimetres focal skin distance.

In the above statement, where the "Mekapion" dosimeter is mentioned it should be understood that a "Hammer" dosimeter used at the same time gave practically identical readings.

APPENDIX 2.

Sydney Hospital.

1. Valves 330263 and 330264. Both installed June 19, 1933.

2. Valve 330263. Punctured January 7, 1935. 2,245 hours.

3. Valve 330264. Taken out January 7, 1935. 1,893 hours.

4. Valve 335666. Installed October 25, 1934 (still in use). 809 hours.

5. Valve 275057. Installed January 8, 1935 (still in use). 536 hours.

Tube Number.	Hours.	Remarks.
2580	192	Mechanically damaged during alteration.
2641	1,558	August 16, 1933, to September 14, 1934.
XP31419	1,025	September 17, 1934. Still in use.

APPENDIX 3.

Tubes Installed at Deep X Ray Department, Royal Prince Alfred Hospital, from April 12, 1930, to March 31, 1935.

Make of Tube.	Kilovoltage.	Type of Mounting.	Life of Tube.	
			Hrs.	Mins.
"Metalix" F200 ..	180	"Wappler" Tube Tunnell.	12	48
"Coolidge"	180	"Wappler" Tube Tunnell.	47	46
"Coolidge"	180	"Wappler" Tube Tunnell.	79	51
"Metalix" F200 ..	190	"Wappler" Tube Tunnell.	44	48
"Metalix" F200 ..	200	"Wappler" Tube Tunnell.	665	25
"Metalix" F220/240	195	"Wappler" Tube Tunnell.	22	23
"Metalix" F220 ..	200	"Wappler" Tube Tunnell.	131	39
"Coolidge Rebuilt"	195	Open suspension.	4	36
"Coolidge Rebuilt"	200	Open suspension.	122	50
"Coolidge Rebuilt"	200	Open suspension.	59	45
"Coolidge" 5W ..	210	Open suspension.	2,321	5
"Coolidge" 5W ..	210	Open suspension.	2,064	56
"Coolidge" 5W ..	210	Open suspension.	1,028 (Still in use.)	0

FRACTURE OF THE NECK OF THE FEMUR.

By JOHN HOETS,
Sydney.

FRACTURES of the femoral neck, particularly in elderly subjects, are difficult to manage and are unsatisfactory from many points of view.

The patient, often old and feeble, sustains the injury so simply in his home; for example, a slight stumble over a mat or step; and from a peaceful, happy, comfortable life he is precipitated into a wretched period of forced recumbency from which he may never rise, or, if he does, his remaining days may be full of trouble and pain.

The doctor has thrust on him a case, always anxious and necessitating constant care over a long period, if the immediate dangers are safely passed, with the ever-present worry as to whether union will occur and with the certain knowledge that no fee he is likely to be paid will adequately recompense him for the work he must put into the job.

The relatives are horrified and distressed to find themselves in charge of a particularly helpless patient, with a very gloomy prospect of six months or more in which the regular routine of life is seriously disturbed and with heavy expenses to be met.

Ætiology.

The cause of this injury is often apparently trivial. The mechanism by which the fracture is brought about appears to depend on some sudden strain when balance is lost and the muscles are caught unprepared. Very often this is in the nature of a twist, as in turning—the foot may catch in a mat or carpet and be held. The body has started to turn and the momentum produced is sufficient to break the feeble neck of the bone, as the limb cannot turn too. In a great many instances the fracture has occurred before the patient falls. At any rate this indirect violence is often the cause of the loose fractures about the middle of the neck.

Those with impaction and intertrochanteric fractures with comminution are due to direct violence on impact at the time of the fall. Such accidents often have a fatal termination in the aged.

Dangers to Life.

The main dangers to life are from: (i) continued pain, shock and exhaustion; (ii) mental disturbance with delirium or delusions and sleeplessness (rendering nursing extremely difficult); and (iii) hypostatic pneumonia as a result of congestion owing to the enforced recumbency.

Occasional complications are pulmonary embolism and acute dilatation of the stomach. (I have not seen the latter, but Dr. Hipsley quoted several cases reported.) Non-union with absorption of the neck may leave the patient permanently crippled or faced with the alternative of a major operation to give stability.

Diagnosis.

Diagnosis should be easy; in fact one can hardly imagine such a fracture being missed, yet one does occasionally meet an example. The history of the fall with pain and loss of function, the local tenderness and shortening of the limb with the characteristic external rotation should in most cases leave to the radiologist only the final word as to the site of the fracture and the condition of the bones involved. When the fracture is incomplete or impacted, the clinical picture is not so definite and may mislead.

I have seen a patient, a middle-aged woman, who received a bump from a tram, was knocked over, but got up and completed a week's holiday in Sydney without undue distress, who returned to duty in a country hospital and carried on for several weeks before a fractured and impacted neck suddenly gave way.

In another instance a Chinese carried on for several weeks in great pain at his work as a market gardener before he sought advice, and after ineffectual treatment for sciatica, X ray examination revealed an incomplete fracture. He was put into a plaster spica with immediate relief, but refused to stay in it for longer than three weeks. At the end of this period the plaster was removed and he went on his way rejoicing, and, so far as I know, suffered no further inconvenience.

In the majority of instances, however, the subjects are old people and the diagnosis easy.

Treatment.

Not long since (and sometimes even now) no attempt to deal with the fracture was made, the surgeon's whole attention being directed to the saving of the patient's life. The injured limb was placed between sandbags. The patient sat up in bed and, as soon as his condition warranted, was out of bed on a chair. Even treated thus, many patients did get union and were able to get about, but very many did not and, if they did not die of exhaustion, or some complication, spent the remainder of life as hopeless cripples. Many methods have been tried, for example, splinting, the application of plaster, extension and immediate open operation and fixation in different ways—by bone-peg *et cetera*. The outstanding success as regards both the patient's condition and in reducing the fracture accurately and securing bony union is undoubtedly that introduced by Whitman.

The Thomas knee splint, that wonderfully efficient apparatus for all lower limb fractures, has many advocates in this lesion. Personally I have not had success with it, probably because I have not been trained by experts in its use, and also because I find it difficult when there is no splint-maker on the premises to get a splint just when I want one. This splint should always be used for transport, and, once it is applied correctly, the patient may be removed to hospital by ambulance or train without distress.

In the Whitman method the limb, after reduction, is put in plaster in full abduction, extension and

internal rotation. The plaster spica extends from the nipple line to the base of the toes, and stays on for from eight to twelve weeks. When in this position, the distal portion of the neck is held up against the proximal fragment and head by the pull of the adductors and the strong anterior portion of the capsule of the hip joint, the Y-shaped ligament — the great trochanter being buttressed against the superior border of the acetabulum. The patient may be moved about in bed and turned on his side or lifted out on to a chair well packed with pillows, and the dangers above enumerated are overcome.

This method is very satisfactory, safe for the patient, very comfortable, and renders nursing easy. The percentages of bony union obtained vary in different hands, and, unless one has a large series to treat, such figures mean nothing. It is generally agreed that quite a large percentage of patients do get bony union. Why do the remainder fail to unite?

We have always believed that the frequent occurrence of non-union was primarily due to senility of the bone and deficient blood supply. That this is not by any means always the reason is becoming more and more clear, owing to recent work in various parts of the world. Two mechanical devices have helped to convince surgeons that here, as in other bones, the commonest cause of non-union is failure to secure one or more of the three essential conditions for constantly good results in fracture work: (i) accurate reduction, (ii) adequate fixation, (iii) maintenance of (i) by (ii) for a sufficient time. The two mechanical devices referred to are the curved cassette and the Smith-Petersen nail.

The curved cassette enables a true lateral X ray film to be taken of the femoral neck. This is very difficult by any other method, even when a shock-proof tube is placed against the perineum. The inclination of the neck to the surface of the body is such that a flat film will give only a very imperfect picture of the head and trochanter, with the neck obscured. The great importance of this lateral view is that it has shown many a reduction, which appears perfect in the ordinary antero-posterior picture, to be in reality very imperfect. One sees examples of the same thing every day in any fracture taken in two planes, and no one of us is satisfied with one view only.

When the neck gives way, the limb falls into external rotation, so that the fractured surface of the distal portion of the neck looks almost directly forward and is lying with its posterior portion against the fractured surface of the proximal fragment of the neck.

In attempting reduction, unless we use Bozan's manœuvre, which I will describe presently, the act of internal rotation necessary to bring the fragments into alignment will cause the distal fragment to impinge against the proximal one and push it backwards, so that very little, if any, end-to-end apposition occurs. This has been clearly seen in lateral views of the neck taken with this type of curved cassette.

The manœuvre described by Bozan, to which I referred, consists in the withdrawal laterally of the distal fragment by means of a swathe round the thigh at the moment internal rotation is carried out, the fragments thus being allowed to clear and to come into true apposition.

When reduction is checked by the antero-posterior and lateral views, the Whitman method will account for a good many less failures than heretofore. There will still be failures, of course, as there will be by any method.

The second mechanical device, the Smith-Petersen nail, is a beautiful thing. Made of rustless steel, its three flanges only 0·75 millimetre (one thirty-second of an inch) thick, it obtains a tremendously powerful grip on the fragments without displacing any appreciable bulk of cortex or spongy bone. A modification, after King, of Melbourne, by virtue of its central canal, allows of its placement over a Kirschner wire, the position of which is determined to be correct by X ray examination in two planes. With fragments held in this way, the three conditions obtain which I stressed previously as being essential for good results; and it is found that bony union occurs in a very much larger proportion than by any other method. (I refer to reported results from various parts of the world.) Besides the increased expectancy of bony union, there is one even more important advantage of using this device, and that is that the patient need have no splinting or appliances of any kind and will, apart from the slight soreness of the small wound, be perfectly comfortable and be able to sit up in bed or in a chair from the second day without any fear of displacement of fragments. This is a wonderful gain in saving of life, time, worry and expense, and can be appreciated much more by the surgeon with previous experience of similar accidents than by the patient, who is apt to think that it could not have been such a bad break after all.

Smith-Petersen Nail Technique.

Speaking generally, there are two ways of placing a Smith-Petersen nail: with or without open operation.

Open Operation.

Open operation has obvious disadvantages for people of advanced age, such as increased risk through shock and infection. However, where adequate X ray facilities for the other method are not available, I do not think these disadvantages can be weighed against the benefits obtained, and I consider the risk of operating to place the nail to be definitely less than those inseparable from the condition treated by other methods. Even by open operation it is not so easy to drive the nail accurately through the centre of the distal fragment into the proximal one, unless one has a fracture table or some means of making traction and holding position beyond the usual theatre staff of nurses.

I have done it several times without difficulty on an orthopædic table, and have seen Mr. Littlejohn, of Melbourne, place one with a strong young man in

charge of the limb to make traction and internal rotation. I have also failed miserably on one occasion, when I tried in a strange theatre, relying on the nursing staff for traction and rotation. The patient in this case was a husky waterside worker, and I should have known better. I had not fully appreciated then what the fracture table was doing for me.

Approach is either through a straight lateral incision with the removal of the great trochanter, the capsule being opened from above, and with the fragments under view the nail being driven into place, or through the classical Smith-Petersen incision or an antero-lateral flap displaying the front of the joint and the trochanter.

The fragments are manipulated into position, and with the joint exposed a very good demonstration is obtained of the value of the Bozan manœuvre in avoiding engagement of the fractured ends when internal rotation of the limb is performed. Even with the whole neck exposed it is not the easiest thing to drive the nail quite accurately, and care is needed to avoid running off the line.

Once the nail is in position it will be seen that the capital fragment is securely held in close apposition and there is perfectly free movement at the joint in a normal manner, with no tendency to displacement. It is seen how much more logical it is to try to hold the small fragment to the bulk of the lower limb than to try, as we do by other methods, to hold the bulk of the lower limb up against the small fragment swivelling about in the acetabulum.

The wound is closed and the patient is returned to bed without any apparatus other than a pillow under the knee for comfort. He may be sat up in bed as soon as the effects of the anæsthetic have worn off, and, as soon as the condition of the wound in the soft parts warrants, he may be placed in an armchair out of bed. From then on after-treatment is the same as in the method next to be described.

Without Open Operation.

The use of the Smith-Petersen nail without open operation is, I think, the method of choice, but it is possible only in a theatre equipped with special apparatus and preferably with a team used to working together. The technique here described in the main follows that used by Dr. Thomas King, of Melbourne, whose modified canaliculized nail and instruments I use.

Indications.—Fractures through the neck of the femur without comminution, that is, offering a good hold for the nail, are suitable for this operation. A fracture adjacent to the trochanter is suitable, provided the trochanter itself is sound. One of my mistakes was due to the fact that I did not recognize gross comminution without displacement of the intertrochanteric region until I had opened down on to it. I did not attempt to put in a nail, but closed the wound and put on a spica; the wound, however, became infected, the only one of my small series, and the end result was very poor, although good union occurred.

Preliminary X Ray Examination.—If the patient is seen before an X ray examination is made, the radiographer is asked to include both hips on his film and to place a piece of metal notched at inch intervals on the skin of the lateral aspect of the thigh, over the great trochanter. On the negative the length of the sound neck is measured against the metal strip and a nail of the correct length is prepared. One may take it that the femoral necks are equal, unless there has been previous disease or injury. This saves time in the theatre, whichever method is used.

Time to Operate.—I like to operate as soon as possible after the accident, and before either enforced recumbency, sleeplessness, worry or pain has had time to depress the patient. Therefore, provided any shock is passed, I say the sooner the better, within three or four days. King keeps patients for two or three weeks with the limb on extension, but I see no advantage in doing so; on the contrary, it seems to me to be running an extra risk.

Anæsthetic.—If there is any reason to avoid a general anæsthetic, spinal anæsthesia is, of course, quite satisfactory. In one patient, however, considered too poor a risk for ether, spinal anæsthesia was attempted, but was abandoned, as the needle could not be introduced between his spondylitic laminæ. He confounded his critics by taking ether without turning a hair. Whatever anæsthetic is contemplated, it must be realized that up to three hours must be allowed for, although usually the business is over in under two hours. A good deal of this time is occupied with the taking of X ray photographs and awaiting the developed films, so that the patient is quietly sleeping, and anæsthesia, if general, is of the lightest.

Special Apparatus Needed.—The following special apparatus is needed:

1. Mobile X ray plant and a dark room; the closer to the theatre, the better. At Lewisham Hospital we have a theatre with dark room leading out of it, so that there is a minimum of time wasted in transport of films to and fro.

2. Traction apparatus and table. This need not be elaborate. It should have provision for the fixation of the patient's feet in any position and the ability to make traction if desired. Also it should be so constructed that both antero-posterior and lateral films of the femoral neck may be taken without disturbing the patient.

3. The Smith-Petersen nail (canaliculized King pattern).

4. Kirschner wires and drill.

5. Other special instruments make the procedure more simple, but are not essential. It is, however, wise to have an "extractor" and to make sure that the nail fits the extractor before the former is introduced. I saw Dr. King have a very unpleasant five minutes when his extractor failed to work owing to a faulty nail head.

Team Work.—As in other surgical procedures, team work is of the greatest value.

The Operation.—The patient has been prepared in the usual way as to skin *et cetera*. He is anæsthetized (general or spinal anæsthesia) and then placed on the traction apparatus, and his feet are fixed to foot-pieces. The fracture is reduced *secundum artem*. Antero-posterior and lateral X ray pictures are taken to check the position. Here occurs the first wait of ten to fifteen minutes for the wet films.

If the position is not correct, another attempt is made, followed by the taking of further X ray photographs and another wait. It is, of course, absolutely necessary to have the fracture accurately reduced.

When position is satisfactory, the prepared area is uncovered and a Kirschner wire is introduced, the position and direction being estimated by bony landmarks. (Dr. King introduces this first wire with a fluoroscope; I cannot do so with my apparatus.) X ray pictures are again taken of the wire in position. Another ten to fifteen minutes' wait follows. The position is not often quite correct, but the position of the wire on the two films makes it much easier to place a second one correctly, or a second and third at the same time without withdrawing the first. In position, it serves as an excellent guide, and the skiagram of it in position is available to give angles in relation to it.

Now another X ray examination is made and a ten to fifteen minutes' wait follows. This time one expects the second or third wires to be in the desired position; if not, the process is repeated. If one is correct, the other two are withdrawn.

The skin is again swabbed with spirit and a knife is passed down to bone along the wire. An incision of sufficient length is made and retracted. The "starter" is now slipped over the wire and the cortex is penetrated. The starter is withdrawn and the nail is threaded on the wire and driven home. While the nail is being inserted, it is necessary from time to time to use the impactor. Just as when trying to nail two pieces of board together, the upper one will lift and has to be tapped down with the hammer, so the distal fragment will tend to separate from the proximal as the nail enters the latter and must be driven back into position again. The wire is withdrawn and the wound is closed. A final skiagram is taken for position before the patient is returned to bed.

After-Treatment.—On return to bed the patient is made comfortable with a soft pillow under the knee. This places the hip joint in a position of slight flexion and greatest comfort. There is no need for any retentive apparatus, as the small proximal fragment is securely fixed to the femur and offers no resistance to any normal movement, provided the joint is a healthy one.

The patient may be sat up in bed as soon as the effects of the anæsthetic, spinal or general, have passed. There is slight soreness from the skin wound and some weakness in voluntary hip movements, but the limb may be moved passively without discomfort and without fear of any harm resulting. The fracture is accurately reduced and adequately fixed, and movements of the limb can cause no movements between the fragments on account of the peculiar properties of the Smith-Petersen nail. The patient may be got out of bed into an armchair the following day, if need be, but, speaking generally, a day or two resting will do no harm, particularly as he can be propped up comfortably.

Massage and active movements to the limbs and unaffected joints may be instituted at once, and gentle passive movements to the hip. These will be found of great advantage when the time for walking arrives, as the elderly patient soon becomes weak without exercise. Particular care is to be taken to keep the quadriceps in as good condition as possible.

Weight-Bearing.—I confess to being uncertain as to the best time to commence weight-bearing. I have not yet had enough experience to find for myself whether there are any dangers in early walking. My patients have begun to take weight, assisted by one person on either side, at the end of a fortnight. I have so far seen no ill-effects; but then my series is only small. It would seem logical to give the support of a walking caliper and crutches, and in a comparatively robust individual this would be my choice; but so many old people—seventy to ninety-one—find these engines so terrifying that I think the personal help is safer, and the better plan is not to rush matters and to let them be comfortable and do what they feel they can accomplish.

The oldest patient I have nailed is ninety-one years. She went out of hospital in two weeks, having sat up in a chair from the second day. She could not do much, but, with one on either side, could walk across the room. Her doctor reported some few weeks later that she was rather depressed about not being able to walk much.

Removal of Nail.—When should the nail be removed? At present my answer would be: not until there is some definite reason for doing so. If it becomes loose, removal is easy. Local anæsthesia is produced, a half-inch incision is made, and it is lifted out.

If the nail is badly placed but firmly held, it is removed with the extractor (one case reported below) through a small incision. It is important to make sure that the nail fits the extractor, as I have seen one instance (before mentioned) of difficulty caused by a nail not fitting. If the patient wished, I should remove the nail at not before six months at the earliest and should then watch carefully with the help of X rays for any sign of trouble and allow very guarded weight-bearing until sure union was good.

Failures.

I think it important when discussing any new procedure that difficulties and failures should be reported more carefully than successes, and therefore the following failures may help those who have not yet attempted this method in the choice of case.

CASE I.—A.T., aged seventy-four years, was admitted with a fractured femoral neck to Lewisham Hospital. He was put up in Whitman plaster in good position. He had a severe attack of pulmonary embolism and the resident medical officer had to cut away his plaster to allow him to be propped up. He recovered from the attack, but the position of the fragments was lost and the femoral neck was seen on X ray examination to have begun to absorb. He was given the choice of operation or replaster and unhesitatingly chose the former.

Open operation was done, fibrous tissue between fragments was cleared away and a nail inserted. He was up in a chair in fourteen days and on crutches in three weeks from operation. He could get about quite well and even take a few steps without his crutches. Absorption continued, however, and the nail became loose and, six months after insertion, was removed through a small skin incision, lying quite free surrounded by serum. He is getting about with his crutches and has non-union.

CASE II.—E.S., aged sixty-five, a female, had what appeared on X ray examination to be a fracture through the distal part of the neck of the femur. Open operation revealed what had been missed in the film: gross comminution of the trochanteric region without displacement. The fracture was obviously unsuited for nailing, and so the wound was closed and the limb was put up in Whitman plaster. Infection supervened and the patient made a very tedious and troubled recovery, bony union occurring in bad position.

This was a bad mistake, as the fracture would have almost certainly done well by any method but the one chosen. Enthusiasm here overcame judgement, with very bad results. That lesson has been well learned.

CASE III.—T.M., aged sixty-eight years, had a fracture through the middle of the neck of the femur. Open operation was performed in a strange theatre without adequate assistance and with no traction (case previously referred to). Difficulty was found in maintaining position and, although the nail appeared to have been placed accurately at operation, X ray examination revealed that it had only partially entered the proximal portion of the neck. This carried away and the Whitman method was used after withdrawing the nail, with good bony union eventually.

This case taught me that even with the site of fracture exposed it is possible to place the nail in bad position, particularly when no traction apparatus is available.

CASE IV.—M.B., aged sixty-five years, with pernicious anæmia, was a very sick woman. The nail was placed accurately and good union apparently took place (X ray examination suggested this), but constant pain was due to osteoarthritis of the hip, as shown in the film.

This was hardly a failure as far as the method is concerned, but was certainly an unsatisfactory case.

Conclusion.

I believe we have in the Smith-Petersen nail a very useful piece of apparatus, which, in properly selected cases, will be the means of saving many lives, and, almost as important or perhaps more important, of saving old people towards the end of their lives many weeks of discomfort and misery. There will probably be improvements in technique, but it appears at present that it will be a method for use only in a well equipped hospital.

One great advantage is the saving of time. Instead of three to six months in hospital, it means a stay of two or three weeks.

Finally, I believe it will greatly increase the number of cases resulting in good position with good bone union.

DISCHARGING EARS TREATED BY THE IODINE POWDER METHOD.

By R. H. BETTINGTON, B.A., B.M., B.Ch. (Oxon),
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OVER a period of twelve months from April, 1933, to April, 1934, in the out-patients' department of the Royal Prince Alfred Hospital, Dr. Ashleigh Davy and I treated 96 cases of running ears by the iodine powder method, as described by R. Scott Stevenson.[1] We did not follow his methods exactly. Whereas he advocates wiping out the ear with swab sticks, we found it more effective to syringe the discharge, or old powder, out gently and dry the ear, first with swabs and then with puffs of dry air from the insufflator. I shall go over the method used as shortly as possible.

Clean the ear out as described above, looking carefully afterwards to see that all *débris* has been removed; then blow in the powder. A rubber and vulcanite insufflator has been found the most effective. The powder used is a mixture of iodine (0·75%) and boracic acid (99·25%). The iodine is resublimated and dissolved in spirit, and the boracic acid should be very finely powdered and quite dry. The dissociation is very rapid, so the mixture must be kept well closed, preferably in a bottle with a ground glass stopper, and should be renewed at least once a fortnight. For private work I make up my own in small quantities.

All types of running ears were treated over this period, unless there was a definite contraindication, such as semi-occlusion or complete occlusion by a furuncle; actually there was only one furuncle treated.

I have left the recording of these results for twelve months to see how many recurrences came back to the hospital. Of course, some may not have come back to us; but it is reasonable to suppose that if the discharge had dried once, the patients would return on recurrence, provided they were within reach of the hospital.

To make anything like an exact comparison with other methods, one should be treating similar cases by these other methods at the same time. But even that is not a sure test; as everyone knows, one discharging ear will dry up suddenly while another will go on for weeks or months for no apparent reason.

It is only by a general impression over a considerable time that a conclusion can be arrived at, and we are both agreed that this is a better method for the treatment of the chronic running ear than any other we have tried. Some patients complained of considerable pain for a short time after application; one had to have the treatment discontinued for that reason. Two children said they could taste iodine for twenty to thirty minutes afterwards; but neither of them was much worried over it.

A large number of the more chronic cases had been treated in other ways previously: by hydrogen peroxide and spirit drops, by zinc ionization, by glycerine and carbolic drops *et cetera*. During the iodine treatment in some of the more obstinate cases, the patients were given drops for a while or were sent for ionization. We found no case improved by wet treatment which had been already tried with iodine powder; but I have had two private patients with obstinate chronic ears who showed no progress at first with powder treatment, and were then ionized four and five times respectively, and whose ears dried up two and three weeks afterwards with more powder treatment.

A very common history is "discharge on and off for years". The periods between discharges and the number of years are frequently hard to determine; the intervals may vary from days to weeks and even months; but I think that a year's lapse of time should be enough to say that a cure has been effected.

I do not propose to record all the cases in detail, but to give the general findings and to refer to certain ones as being exceptional or illustrative.

While treating the patients it was evident that the results were good, in some cases dramatic; but we were surprised ourselves on looking over the records to see how good they were.

The 96 cases were made up as follows: chronic septic *otitis media* (67), post-operative cases (10), external otitis (7), acute otitis (11), furunculosis (1).

Chronic Septic Otitis Media.

Of the 67 cases of chronic septic *otitis media*, 44 were single and 23 double. Of the 44 one-sided cases, 40 were discharged dry. The history varied from four weeks to twenty-five years. The other four were the following.

CASE 3.—The patient was a male, aged nineteen years, who had had a discharging left ear for five years. A small polyp was present. The polyp was washed out after the first application of powder and a large central perforation was evident. Two more applications were made and the discharge was still present; but the patient did not appear again.

CASE 18.—The patient was a male, aged thirty-two years, who had suffered from right-sided *otitis media* and *externa* for three months. The patient was greatly improved after seven treatments, but was not seen again.

CASE 29.—A female, aged eleven years, had had a discharge from the right ear for one year. She was treated with powder fourteen times and then had three zinc ionizations; there was no improvement. X ray examination then revealed destruction of the bony trabeculæ, so she was sent in for radical operation and I lost track of her.

CASE 74.—A girl, aged six years, who had had a discharge from the right ear for three years, was treated once and then disappeared.

Of these four it is quite possible that three were cleared up; but for the purposes of record they must go down as not cured.

Of the forty patients discharged as cured the following are worthy of mention.

CASE 2.—The patient was a male, aged sixteen years, who had suffered from a discharge from the right ear for four months. He was given thirty bi-weekly treatments before drying up occurred.

CASE 38.—A girl, aged ten years, had had a discharge from the right ear on and off for five years. She had an acute exacerbation when first seen; a very small perforation was enlarged and the ear treated with hydrogen peroxide and spirit drops for fourteen days. She was then given sixteen applications of the powder and was discharged with the ear dry. Between the eleventh and twelfth treatments the ear was ionized three times.

CASE 39.—A female, aged twenty-one years, had had a discharge for fourteen years from the left ear; she had two ionizations before being treated with powder. Two years before she had had her tonsils removed, and shortly after had a double radical antrum operation performed. After four applications of powder the ear was dry.

CASE 41.—A female, aged seventeen years, had had a discharge from the left ear on and off for fourteen years; intervals of freedom varied from two weeks to two months. The tympanic membrane had one large posterior and one small anterior perforation. The ear was dry after ten treatments.

Two cases (67 and 76) were curious rather than illustrative, as both patients had pieces of cotton wool in their ears.

CASE 67.—The patient was a female, aged forty-two years, who had had a discharge from the right ear for fourteen years. I removed a foul-smelling wad from her ear. A 10% solution of silver nitrate was applied to some granulations, the reduction of which revealed a large central perforation. The discharge dried after four applications of powder. The patient had no idea how long the cotton wool had been *in situ*, as she had been plugging her ears ever since the discharge started.

CASE 76.—A male, aged thirteen years, had the same condition as in Case 67; but the discharge had been running from the right ear for only two months. One application was sufficient.

CASE 87.—A female, aged thirty-two years, had had a discharge from the left ear on and off for twenty-three years. A large anterior perforation was present. The ear dried up after one treatment.

There were 23 patients with double discharging ears; and of these, eighteen were known to have lost their discharge. Three of the remaining five (7, 65 and 88) had only one treatment and then did not come again.

CASE 31.—A boy, aged eight years, had had a discharge from both ears for eighteen months following scarlet fever. He had been treated with rectified spirit drops, and the ears had dried up several times, but the discharge kept on recurring. The left ear dried after twelve treatments and the discharge did not recur; but the right side did not dry at all. X ray examination revealed necrosis of the bone, so a radical operation was performed. The right ear is still discharging at intervals.

CASE 60.—A man, aged sixty years, had had a discharge from both ears for thirty years, and posterior perforations on both sides. He was subject to increasing attacks of vertigo, but no fistula symptoms could be detected. Six powder treatments gave no result and he was sent in for a double radical mastoid operation. His giddiness has improved, but the discharge is still present.

Of the 18 cases observed to dry up the following are of note.

CASE 1.—A male, aged five years, had had a double discharge for four years. Both ears dried after four treatments.

CASE 6.—The patient was a female, aged twenty-eight years. This was the most obstinate case of all. Both ears had been running for four months after a cold. The meati were very narrow indeed, and both tympanic membranes had anterfor perforations. In all there were fifty-seven applications of powder, the left ear drying up just before the right. In between the twenty-ninth and thirtieth treatments there were four ionizations, which made no appreciable difference.

CASE 21.—A female, aged fifteen years, had had double *otitis media* for seven years; four years previously a polyp had been removed from the right ear. A central perforation was present on the right side, and an anterior one on the left. The left side was dry after seven treatments, and the right after eight.

CASE 32.—A female, aged seventeen years, had had double discharge since infancy. Both sides were dry after five treatments.

CASE 46.—A female, aged thirty-two years, had had a double discharge for years; in fact she was unable to remember when she had not had it. Both membranes had large central perforations and there was some external otitis. The left side required five treatments and the right nineteen.

CASE 49.—The patient was a female, aged eight years, who had suffered from double *otitis media* on and off for five years; she also complained of nasal discharge, and both antra were dull to transillumination and X ray examination. The patient was put down for double intranasal antrostomy; but the ears dried up before this was done, the right after two treatments, the left after seven. After operation the antra discharged copiously for over two months, but finally the wash-out return was clear.

CASE 91.—A male, aged twenty-five years, had had a double discharge since he was a child. Both membranes were perforated, the right posteriorly and the left centrally. Both sides dried up after three treatments.

CASE 96.—A male, aged twelve years, had had both ears running for eight years. Both became dry after five treatments.

Post-Operative Cases.

There were ten post-operative cases (four radical and six Schwartze operations). Three of the patients on whom radical operation had been done were unimproved by a long period of treatment; one lost the discharge after six treatments, but is back again under treatment now. While on this subject I should mention that one case I had in private practice after a radical operation was a long time clearing up; but four applications of powder were effective and there has been no recurrence.

Of the six cases following Schwartze operation, four dried up after from one to seven treatments; two patients did not attend again after one treatment.

CASE 45.—A female, aged eighteen years, had had her left mastoid operated on eighteen months before, and it had been discharging ever since. The ear dried up completely after seven treatments.

External Otitis.

Seven patients with external otitis were treated; six recovered very quickly, four applications being the maximum; while one did not reappear after coming once.

Acute Otitis.

Eleven patients with acute otitis were treated; six recovered with very few applications, three attended only once, and two still had a discharge after five and six applications and also disappeared.

Furunculosis.

One furuncle has been mentioned already; it dried after two applications.

Conclusion.

I think these reports indicate that this method of treatment is the best available for chronic discharging ears; at least, if there is a better one, both Dr. Davy and I should be very glad to hear of it.

For my own part I am so convinced, that any discharging ear that comes under my care I treat in this manner; as I consider that, not only is it more likely to dry up the discharge, but it will do so more quickly than any other method.

Reference.

(1) R. Scott Stevenson: "Chronic Septic Otitis Media Treated by Iodine Powder", *The British Medical Journal*, January 21, 1933, page 95.

Reports of Cases.

ANAPHYLAXIS IN A PATIENT SUFFERING FROM TETANUS.

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Clinical History.

MRS. L.D., aged forty years, was admitted to the Perth Hospital on January 26, 1935, with the provisional diagnosis of tetanus. Her history was that she had induced a miscarriage twelve days before, with the aid of a syringe and castile soap. Six days before her admission to hospital her appetite began to fail, and four days before she noticed stiffness of her jaws, and consulted a chemist, who treated her for "neuritis" with a liniment.

On examination, no abnormality was discovered beyond extensive dental caries with pyorrhœa and definite trismus. The patient's temperature was 37·9° C. (100·2° F.), the pulse rate 84 and the respiration rate 20 per minute.

A diagnosis of tetanus was made, and appropriate treatment was instituted. The patient was given 30,000 units of anti-tetanus serum intravenously, and 30,000 units intramuscularly on the evening of admission. On January 28, 1935, rigidity of the abdominal wall, with some neck stiffness, had appeared, and a further intramuscular dose of 40,000 units of anti-tetanus serum was administered.

On February 2, 1935, the patient's condition was much the same, and a further 40,000 units of anti-tetanus serum were given intramuscularly. Sedative treatment consisted in giving morphine, "Sodium amytal" and paraldehyde by mouth and by the rectum. At no time were spasms observed.

By February 4, 1935, the signs of tetanus were beginning to abate, but serum sickness became manifest, consisting of urticarial rash, pains in the joints and enlarged and tender cervical glands. This condition failed to respond to adrenaline, atrophine and ephedrin.

On February 5, 1935, the patient's temperature reached a maximum of 39·56° C. (103·2° F.) (having averaged 38·35° C. (101° F.) since her admission to hospital), and the suggestion was put forward that this pyrexia was due

to streptococcal septicæmia following the miscarriage, and not due to the tetanus or serum sickness. It was also suggested that 100 cubic centimetres of anti-streptococcal serum be given intravenously.

On February 7, 1935, the patient's sensitivity was tested out by the intradermal injection of 0·12 cubic centimetre (two minims) of anti-streptococcal serum. A very faint erythematous reaction was observed after thirty minutes. Subsequently 0·12 cubic centimetre (two minims), 0·24 cubic centimetre (four minims), 0·5 cubic centimetre, 1 cubic centimetre, 2 cubic centimetres, 5 cubic centimetres and 10 cubic centimetres, were injected subcutaneously at half-hourly intervals. Then 1·2 milligrammes (one-fiftieth of a grain) of atropine was immediately injected intramuscularly, and half an hour later the intravenous administration of the serum was commenced. It was given as slowly as possible, and towards the end of the first 20 cubic centimetres the patient became restless, and in a few seconds was extremely dyspnœic and cyanozed, expressing a fear of impending death. She was immediately given one cubic centimetre of adrenaline intramuscularly, together with 0·6 milligramme (one one-hundredth of a grain) of atropine a few minutes later. As the acute stage passed off she began to complain of intense pruritis, due to the eruption of an urticarial rash. Within five minutes her symptoms were relieved, except for the severe itching, which, together with the rash, had disappeared in six hours. Next morning the patient felt quite well, and her temperature was 38·35° C. (101° F.), with a pulse rate of 100. Within the next four days the patient's temperature subsided, her trismus became less, and on February 16, 1935, she was apyrexial, and was discharged on February 19, 1935. Blood culture was attempted on February 6, 1935, and no organisms were grown.

Comment.

The interesting feature of this case, apart from the debatable point of the presence of streptococcal septicæmia and influence, if any, of anti-streptococcal serum in this condition, is the occurrence of anaphylaxis in spite of desensitization by the subcutaneous route, and the administration of 1·2 milligrammes (one-fiftieth of a grain) of atropine.

This patient was given anti-tetanus serum on the first, third and eighth days of her illness; she developed serum sickness on the tenth day, and was given anti-streptococcal serum on the thirteenth day.

Should it not have been safe to give anti-streptococcal serum five days after the last dose of anti-tetanus serum, that is, before the patient would be sensitized to horse serum in the normal course of events? Is desensitization by the subcutaneous route sufficient before giving large doses of serum intravenously, or should desensitization by the intravenous route follow on the subcutaneous, as this case seems to suggest? Does not the occurrence of anaphylaxis following the prophylactic injection of 1·2 milligrammes (one-fiftieth of a grain) of atropine sulphate suggest that the action of this drug, advocated in some quarters as a preventive of anaphylaxis, is not so certain as stated?

Have any of the readers of THE MEDICAL JOURNAL OF AUSTRALIA experience of, or ideas on, this subject?

Reviews.

A PÆDIATRIC "BRADSHAW".

AFTER eight years of painstaking collecting, arranging and cross-relating of pædiatric information, Dr. Wilburt C. Davison has produced "The Compleat Pediatrician", an infantile "lexicon" which defies accurate definition, but might be classified as a "Pædiatric 'Bradshaw'".[1] This unique production begins with a pædiatric mutation of the title page of Izaak Walton's classic of 1653, ends with detailed suggestions for the contents of the modern pædiatrician's bag, and contains an enormous amount of carefully arranged and indexed information in its rather closely printed pages.

The introduction explains the principles on which the work is based. There are three hundred and seven distinct pædiatric diseases, of which one hundred and fifty-eight are common and one hundred and forty-nine are rare. There are seventy-nine important symptoms and signs and two hundred and fourteen variations of these. There are thirty-seven preventible diseases, which account for 56% of the deaths in childhood, and sixty-three diseases which account for 21% of the deaths and which should respond to appropriate therapy. Dr. Davison points out that, as patients suffering from the remaining two hundred and seven conditions usually recover or succumb regardless of therapy, these diseases should not be considered until all possibility of the presence of one of the curable conditions has been eliminated.

The main text consists of numbered paragraphs each of which contains a mass of abbreviated pædiatric facts and many cross-references, the whole being controlled by an excellent and complete index of diseases, symptoms and signs.

From a random sampling of this mass of indexed information, it would seem that the book may prove useful as a reference "lexicon" for both the pædiatrician and the general practitioner, though on general principles we do not approve of books of this type.

THE CHEMISTRY OF THE CARBOHYDRATES.

A COMPLETE survey of the present state of carbohydrate chemistry, such as that given by E. F. Armstrong and K. F. Armstrong in "The Carbohydrates", is very useful.[2] The work is a partial successor to an earlier one, entitled "The Simple Carbohydrates and the Glucosides". A year or two ago "The Glycosides", by the same authors, brought the glucoside section of the earlier work up to date, and now the carbohydrates proper are similarly dealt with. The book is a well balanced survey of the field and is to be specially commended for its comprehensive bibliography of both British and foreign literature. It is obviously not intended as a systematic introduction to the purely structural chemistry of the carbohydrates; but its aim seems to be rather the provision of a chemical foundation for the biochemical applications of sugar chemistry. One cannot be otherwise than impressed by the vastness of the amount of work that is summarized. Whether it will all stand the test of time and further experience is open to doubt, but one can see a picture of this branch of chemistry emerging in dim outline from the fog of recorded facts and non-facts. Another impression the reader obtains is that the terminology of sugar chemistry is apt to get out of control. The mental effort required to keep in mind the exact significance of a range of terms such as glucide, glucoside, glycoside, glucoseen, glucal, pseudo-glucal, protoglucal, is stupendous. When the whole picture becomes a little clearer, there will be much room for a systematization of the terminology.

[1] "The Compleat Pediatrician: Practical, Diagnostic, Therapeutic and Preventive Pediatrics for the use of Medical Students, Internes, General Practitioners and Pediatricians", by W. C. Davison, M.A., D.Sc., M.D.; 1934. Durham: Duke University Press. Royal 8vo.

[2] "Monographs on Biochemistry: The Carbohydrates", by E. F. Armstrong, D.Sc., Ph.D., LL.D., F.R.S., and K. F. Armstrong, M.A., B.Sc.; Fifth Edition; 1934. London: Longmans, Green and Company. Royal 8vo., pp. 259. Price: 15s. net.

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HOSPITALS AND THEIR HONORARY MEDICAL OFFICERS.

MUCH of the discussion on hospital practice in Australia centres round what is known as the honorary system — the treatment of patients in public hospitals by honorary medical officers. As a rule these officers are appointed for stated periods, and at the expiration of these periods are eligible for reappointment. The medical profession insists that it shall treat the sick poor without fee or reward. When public hospitals were reserved for persons who were without financial means, the honorary system worked well as far as most members of the medical staffs were concerned. From the point of view of the hospital the system was satisfactory, as, indeed, it is at present, only if the method of appointment resulted in the choice of an efficient staff. Now that hospitals are being used for the treatment of all and sundry, the honorary system is in some places in jeopardy; in others efforts are being made to replace it by a wholly paid service. In these circumstances it may be useful to reemphasize some points of importance in connexion with honorary service.

In the first place acceptance of appointment imposes definite obligations on the appointee. The man of honour will feel himself bound to be more punctilious in carrying out duties that he has voluntarily assumed, than he would be if he were paid. This is occasionally forgotten by honorary medical officers; it is almost always forgotten by those who would replace honorary by paid service. In most Australian hospitals, particularly in metropolitan and teaching hospitals, the standard of practice is undoubtedly high. Even so, efforts may still be made to make the good better, and the better best. As an example of how this may be done we would draw attention to two papers published during the last few months. In the first, published on April 13, 1935, Dr. H. Skipton Stacy made a plea for more intensive study of surgical pathology. He showed how case histories should be analysed, studied and criticized after every death. The second paper, by Dr. J. V. Duhig, appeared in the issue of May 25, 1935. He also taught his lesson by reference to the autopsy room. We would advise those who have not seen these papers to read them with care. It is obvious that study of the kind laid down by Dr. Stacy and Dr. Duhig cannot fail to benefit the patient, to redound to the credit of the hospital, and to enhance the reputation of the practitioner. But the duty of the honorary officer lies in other directions also. The body controlling the hospital and its appointments should be fully aware of the duty of its officers and should devise some means of ascertaining whether they are zealous in its discharge.

This brings us to the point that the controlling body really has the matter in its hands. If it is wise in making its appointments, it will have little trouble in later years. Unfortunately the appointment does not always go to the most suitable candidate. All sorts of considerations are allowed to influence decisions. Often there is an excessive

zeal to appoint graduates of Australian universities merely because they have graduated in Australia, even though graduates from Great Britain with the highest qualifications have offered their services. Women, well qualified and experienced, have been rejected for appointments to which they are peculiarly well suited, merely because they are women. Candidates who are relatives of persons highly placed in the social scale have been chosen over the heads of those more deserving. Even political pressure has been brought to bear. Hospital boards which allow themselves to be influenced by considerations other than those of professional ability, combined with high character and an attainment of general culture, deserve to be saddled with an unworthy staff. It is unfortunate that the opportunity of rectifying an initial mistake is seldom grasped. When a member of a staff comes up for reappointment at the expiration of his term of office, it is almost an unwritten law that he should not be opposed. This is a pernicious practice. It implies that the holder of the appointment has proprietary rights in it. There should be no proprietary rights in an honorary appointment. An honorary officer who has served his institution faithfully and well should not be denied a second term of office. At the same time no stigma should attach to a practitioner who opposes a member of a staff coming up for reappointment. Until this practice is adopted, hospital boards will have no simple way of rectifying an initial mistake. A board claiming to rectify a mistake should, of course, be actuated by a desire to promote the good of the institution and by nothing else. That such boards do exist we have no doubt; they need some stimulus to urge them to act.

Current Comment.

DIGITALIS IN PNEUMONIA.

SHALL we give digitalis in cases of lobar pneumonia? This is an old subject for debate. There have been several grounds on which the use of this drug has been recommended. First there is the purely empirical, that it has been found that more or less massive doses of digitalis leaf were beneficial in hastening the recovery of the patient and lessening the toxic effect of the disease. Then it was assumed that the rapidly beating heart of pneumonic infections was benefited by having its too hurried action controlled; since we have understood the true action of digitalis it is hard to sustain this argument. Comparison may be made between the effects of digitalis in hyperthyreoidism (if any) and those in the same disease complicated by auricular fibrillation. Still later it was suggested that as digitalis was known to be in some fashion "fixed" to the cardiac muscle, so it might have some protective action in cases of infection. But here there is a fallacy; for the effect of pneumonia on the circulation is not only on the heart. In fact it may be said with substantial truth that it is very much more on the peripheral circulation than on the heart itself. Do not we see those toxic and fatal cases of lobar pneumonia in which the cardiac condition remains remarkably good to the end? Alfred E. Cohn and William H. Lewis have made a contribution on the subject based on a review of the records of 1,456 patients suffering from pneumonia treated at the hospital of the Rockefeller Institute over a period of twenty-one years.[1] They criticize the recent work on the same question as being not sufficiently representative. Wyckoff, Du Bois and Woodruff, and Niles and Wyckoff have published careful studies based on large numbers of cases observed over a relatively brief period, with alternate cases used as controls. One of the conclusions arrived at was that the routine administration of digitalis was dangerous. Cohn and Lewis consider, however, that the variable factors of the degree of virulence of the disease and the susceptibility of the patient were not sufficiently allowed for in this inquiry. In the present instance they have not attempted such refinements as considering singly the various prognostic factors, nor have they restricted their inquiries to a brief and therefore presumably well-controlled period. They point out that a brief period might well fall within the duration of a definite epidemic, and for this reason alone a long span of time over which the cases are studied is an advantage. They found that in their series the average death rate month by month only deviated from that observed over the whole period by 4·21%, an error that was not significant. Of course this argument might be used both ways, as it would also apply to a shorter period. Factors that were considered relevant in assessing the seriousness of a pneumonic infection in any given individual were the type of work done, the type of infecting organism, the age of the patient, alcoholism, the presence of bacteria in the blood stream, the number of lobes involved, the presence of preexisting cardiovascular disease, and the occurrence of complications. The number of previous attacks of pneumonia and the occurrence of serum sickness did not appear to be of prognostic importance.

[1] *The American Journal of the Medical Sciences*, April, 1935.

It is impossible to enter into a discussion of the methods of such a research as this, for they are purely statistical; only the conclusions can be given here. It may be remarked, however, that the authors assume that whatever effect digitalis can have upon the heart in any febrile illness, it may have in pneumonia. They also point out that the well known benefits that it confers upon the heart in fibrillation and flutter must be recognized, and though these events would only be likely to occur in the senescent or diseased heart, they do occur in those patients who constitute a poor risk in pneumonia. They summarize their conclusions as follows: that giving digitalis does not seem to influence the course of events in lobar pneumonia; that it has a favourable action in cases where auricular flutter or fibrillation occur; that it is uncertain whether digitalis precipitates fibrillation as has been averred, but that if so it is only in a few of the younger patients; that the outcome of the disease depends on the general severity of the disease, according as there is more than one lobe affected, whether bacteriæmia occurs and whether there are other complications. It is of interest to note that they found no evidence of the occurrence of heart-block during the febrile period except due to the administration of sufficient digitalis to produce this effect. The impression is given that the drug is of doubtful use in one sense. But if it is remembered that the days when it was vaunted as a specific are long past, and that if it is given it must be in accordance with the known pharmacology of the drug, it will probably continue to be employed in cases for which it seems to be suitable. Is not the position really this, that we must attempt to find out as accurately as possible the full action of any drug we employ, and armed with knowledge as complete as is possible that we should have a definite and logical reason before we prescribe it?

ATHEROMA.

IT is perhaps only since the common occurrence of coronary disease in comparatively young persons has been recognized that sufficient notice has been taken of atheroma. This striking degenerative change of the intima of large and medium-sized blood vessels is known to be chiefly fatty in nature; it is also known to be common in diabetes and other diseases in which the cholesterol content of the blood is raised, and can be produced experimentally in animals fed on a high fat diet. That it bears some relation to morbid states, such as infections, is also known, for it may at times be seen in the larger blood channels of young persons who have died from an intense but continued infection. Strain plays its part as well, for this particular type of intimal damage is very common in the arteries of sufferers from hypertension, and specially significant is its occurrence at the points of greatest wear and tear. That the left coronary artery is one of these sites must be regarded as a pathological tragedy in many cases, for at autopsy it is possible to see cardiac infarction in men (for they are usually men) who are not only relatively young, but whose arteries are in the main healthy, except for that fatal patch that has caused a thrombus in so unfortunate a place. The same might be said of cerebral accidents of a certain type, though these are less common, and generally associated with a more widespread vascular change. Reference to these commonplaces in pathology needs no apology, for it happens all too frequently that the lessons of the *post mortem* room are forgotten in practice. But, it will be argued, what is the use of these academic considerations when nothing can be done to stave off such vascular accidents? The answer is that we hope that successful prophylaxis will be practised in the future, and that in any case it is our duty to know the cause of all disease, where possible. Besides, there may be a glimmer of light ahead. The experimental production of atheroma in rabbits by cholesterol feeding has been referred to above; this becomes much more interesting when it is realized that these animals can be protected from the full intensity of such morbid changes by the administration of iodides or thyreoid extract.

There is some fresh work to hand, for I. V. Page and W. G. Bernard have not only confirmed this observation, but have shown that although the changes in the walls of the blood vessels were thereby largely prevented, there was still a high degree of lipæmia found in the animals.[1] The animals were fed with cholesterol and olive oil, forced feeding being used, to insure accurate dosage; as well as this, an ordinary diet was allowed. An organic iodine compound was used for the protective substance. Only the animals which did not receive the iodine showed extensive deposits of cholesterol in the liver and the aorta, but all the animals were found to show a great increase in the lipids of the blood. There are certain chemical differences in the variety of lipæmia found in these laboratory animals to that found in the human subjects of such a disease as nephrosis, but this need not concern us for the moment. The interesting fact is that the rabbits fed with fat *plus* iodine actually had a higher blood fat than those fed with fat alone, yet the former suffered no deposit of cholesterol in the aorta. As the authors remark, there seems to be some additional factor at work in some way altering the receptivity of the intimal cells to fat. One such factor is known to be vascular strain, as pointed out above, but there is apparently still another. What is this factor, and how is it related to the ingestion of iodine in the animal that is the subject of experiment? The answer will be eagerly awaited, for it seems quite feasible that atheroma may be a deficiency disease. If this proves to be so, and if prevention becomes possible, it will be a vital necessity for the diagnosis to be made in the living patient, not merely in the cadaver.

[1] *Archives of Pathology*, April, 1935.

Abstracts from Current Medical Literature.

THERAPEUTICS.

Pregnancy Urine Extract.

P. STARR AND H. PATTON (*Annals of Internal Medicine*, January, 1935) recorded observations of remissions in hyperthyreoidism induced by extract of urine from pregnant women. One cubic centimetre of "Antuitrin S" (pregnancy urine extract) or of "Theelin" was given subcutaneously daily or three times a week. "Antuitrin S" was usually given for one week before the menses for three months, and "Theelin" for two weeks, also in some cases before the menses. Good results were obtained in young girls and young women, but in older women at or beyond the menopause or when ovarian function had been interfered with by disease or surgical operation the results were unsatisfactory. It is assumed that the effect of this treatment was produced through the action of the extract on the ovary.

Liver Extract.

P. J. FONTS, O. M. HELMER AND L. G. ZERFAS (*Annals of Internal Medicine*, January, 1935) record studies on increased potency of liver extract by incubation with normal human gastric juice. It had been shown that the potency of whole liver was greatly increased after its digestion with human gastric juice. In this study the effect of similar treatment of liver extract was tested. The extract was incubated at 40° C. for two to four hours with varying amounts of human gastric juice. The preparation was given by mouth for ten days to patients having pernicious anæmia in relapse. A maximal reticulocyte response followed the administration of four grammes of liver extract which had been incubated with 100 cubic centimetres of gastric juice; smaller amounts than four grammes were not effective, and at least 50 cubic centimetres of gastric juice were necessary to produce maximal reticulocytosis when daily doses of 4·5 grammes of liver extract were given.

Chorea Treated by Injection of Distilled Water.

G. ARBOUR STEPHENS (*The Lancet*, December 22, 1934) records his experience in the treatment of a patient suffering from chorea. A girl, aged fourteen years, was admitted to hospital after a fortnight at home and treated with calcium lactate and parathyreoid gland in 0·03 gramme (half-grain) doses. The spasms were not controlled, and interfered with speech and sleep. Subcutaneous injections of distilled water, 10 cubic centimetres daily, were given, so that two nights later she was able to sleep comfortably. At the end of two weeks she was able to sit up and feed herself. The writer has also used this treatment in other severe cases with good results.

Viscum Album.

C. S. DANZER (*Medical Record*, November 7, 1934) discusses the use of a dialysate of *Viscum album* (mistletoe) in the treatment of arteriosclerotic and hypertensive disorders. Many of the symptoms in these conditions could be relieved by the use of *Viscum album* dialysate (viscysate) in doses of 20 to 35 drops thrice daily. *Pulsus alternans*, *angina pectoris*, insomnia, headaches, giddiness and nervous symptoms were relieved by the use of this drug alone, or in combination or alternation with "Diuretin", digitalis and "Theominamytal".

Prostigmin in Myasthenia Gravis.

FOLLOWING the experience of M. B. Walker in the use of physostigmine, E. A. Blake Pritchard (*The Lancet*, February 23, 1935) has used prostigmin in the treatment of seven patients suffering from *myasthenia gravis*. All showed a striking improvement with immediate relief of symptoms. Each patient was examined before and after an injection of 2·5 milligrammes of prostigmin with 0·65 milligramme of atropine sulphate, which was added to counteract the slowing of the heart and peristalsis of the bowel. The muscular power was tested by means of a dynamometer, and in three instances myographic records of the tension developed in these muscles on electrical stimulation of the motor nerves before and after injection. The only untoward symptoms produced are tightness round the orbits, lachrymation, fibrillary twitching in the eyelids, muscles of the neck, arms or legs. Within five minutes of the injection a dramatic change comes on, all the affected muscles being restored to full muscular activity. In one instance the dynamometer showed a hand grasp of five pounds before the treatment and thirty-five pounds half an hour later. Eyelids which had fallen to cover half the pupil were raised to expose the conjunctiva above the iris. The maximum benefit is obtained in from twenty to thirty-five minutes after injection, the effect being completely lost at the end of eight hours. At the present time the myoneural junction is the possible site of disorder in *myasthenia gravis*, and the writer has previously shown that if the ulnar nerve in such a patient is stimulated electrically with condenser discharges at a high frequency of repetition, the tension developed in the flexor muscles of the fifth finger produces a characteristic myographic record which differs strikingly from that of normal persons and from that of any muscular weakness other than that due to *myasthenia gravis*. The form of this curve provided direct confirmatory evidence that the weakness in this condition is due to a disturbance of the myoneural junction. It can be shown that prostigmin restores the myogram to the normal form while simultaneously restoring the patient's strength. The effect of prostigmin is probably due to its property of delaying the destruction of acetylcholine at the motor nerve ending by the choline esterase normally present in the blood.

Quinidine Sulphate.

C. M. KOHN AND S. A. LEVINE (*Annals of Internal Medicine*, February, 1935) discuss the value of quinidine sulphate in persistent auricular fibrillation. Forty-nine cases were analysed. It appeared doubtful whether the patient's health was benefited by restoring normal rhythm. Quinidine may give rise to thrombosis or to a variety of other toxic effects, including sudden death. In fibrillation of rheumatic origin it is more difficult to restore normal rhythm than in fibrillation associated with hyperthyreoidism or middle age. The author found that quinidine restored normal rhythm for only six months or so, unless it was repeatedly administered; it was less certain in chronic cases, and rather dangerous unless the heart was otherwise normal. Indications for using quinidine are fibrillation in an otherwise normal heart, after thyreoidectomy, for intractable palpitation, and in otherwise hopeless cases.

Blended Fish Oils.

H. W. BROCKLESBY AND R. G. LARGE (*Canadian Medical Association Journal*, May, 1935) discuss the use of blended fish oils for medicinal purposes. Oil was expressed from the pilchard and the liver of the grey fish and mixed in proportions of four to one. The result was an oil of high vitamin *A* and moderate vitamin *D* content. After purification the blended oils were administered to groups of children, 16 cubic centimetres (four drachms) daily for five days a week. Control groups were given cod liver oil, and another group received no medication. The result showed a diminution in throat affections and colds in the children treated with the blended oils. Further tests showed that an oil could be prepared containing 800 units of vitamin *A* and 75 units of vitamin *D*. This blend is being tested by the authors and seems to have valuable prophylactic qualities.

Ephedrine Sulphate.

C. R. WEIS (*Annals of Internal Medicine*, February, 1935) describes a case of postural hypotension, cured with ephedrine sulphate. The patient, a woman aged forty-one years, was subject to fainting attacks. The systolic and diastolic blood pressures were 130 and 84 millimetres of mercury when the patient was lying down, and 84 and 60 when she was in the erect posture. She was depressed and weak; nocturnal micturition and a mild secondary anæmia were present. Atropine caused no change in the

pulse rate; 1·0 cubic centimetre of adrenaline, 1 in 7,000, raised the pulse rate to 124 and caused nervousness and tremor. Treatment with strychnine, adrenaline and endocrine preparations were without benefit, but treatment with ephedrine sulphate, twenty-five milligrammes every three hours for two weeks, produced definite improvement, and a less frequent dose for some weeks was followed by complete recovery.

Insulin in Furunculosis.

A. RAIGA, J. MARTINEAU AND H. CHABANIER (*La Presse Médicale*, February, 1935) describe investigations into the rôle of hyperglycæmia in furunculosis. Their observations revealed that the blood sugar was often considerably increased in patients with furunculosis about the body or the face. Apart from local treatment, it is necessary to prescribe a diet of low carbohydrate content and to inject insulin in sufficient dosage to reduce the blood sugar to normal.

NEUROLOGY AND PSYCHIATRY.

Epilepsy in Identical Twins.

RILEY H. GUTHRIE AND WILLIAM M. LEBOWITZ (*The Journal of Nervous and Mental Diseases*, April, 1935) have enriched the vast literature on epilepsy by the clinical presentation of three cases of epilepsy occurring in identical twins. Each pair of twins had both epilepsy and mental deficiency. Detailed histories and clinical neurological examinations accompany the presentation of these cases. These authors believe that every individual has epileptic potentialities or a certain threshold at which seizures may be produced; and, further, that, given poor endowment, metabolic or emotional disturbances, cerebral insults precipitate seizures at a relatively low threshold. Uniovular twins have the same inherent physiological and structural potentialities and should, therefore, show characteristic likenesses in the matter of disease. Autopsy findings are included. There were extensive pathological cerebral defects in all cases. The onset of the epileptic seizures occurred within three months in two of the cases and within the same year in the third. One set of twins were deaf mutes. These authors claim to have demonstrated in these cases congenital cerebral structural defects, the basis of later epileptic seizure, too frequently attributed to environment.

Psychoses following Administration of "Atebrin".

A. NEAVE KINGSBURY (*The Lancet*, November 3, 1934) reports on certain psychotic states associated with or induced by the use of "Atebrin" in the treatment of malaria. Toxic symptoms are known sometimes to follow the exhibition of "Atebrin"; these include headache, epigastric pain of a colicky nature, and yellowing of the skin and scleræ. A more interesting symptom is that known as "cerebral excitation". Six cases with psychoses are reported and commented upon in this paper; some patients developed mild and transient mental symptoms, while others manifested such serious symptoms as to need special mental care. The author advances three possible explanations of the origin of the mental symptoms occasionally produced by "Atebrin", namely: (i) cases of mental imbalance following untreated or quinine-treated malaria are occasionally reported; (ii) the action of atebrin may bring about an increased liberation of malarial "toxins"; and (iii) "Atebrin" itself may be the toxic agent that determines the attack. "Atebrin" in lethal dosage is known to have a toxic action on the nervous system. Two of the patients reported in this series had a previous mental breakdown. Mental symptoms have been noted after a minimum of six tablets (that is, 0·3 gramme daily), a maximum of 21 tablets, and an average of 13 tablets. In the light of this, the author suggests that although the plasmodicidal effect of "Atebrin" is less favourable in a daily dose of 0·2 gramme than with the larger dose, one should heed the risk of producing mental symptoms which are occasionally serious, and should err on the side of caution.

Dinitrophenol in Dementia Præcox.

ISIDORE FINKELMAN AND W. MARY STEPHENS (*The Journal of Neurology and Psychopathology*, January, 1935) state that therapeutic doses of dinitrophenol have been known to increase metabolism. These authors therefore thought that *dementia præcox*, which is marked by indifference and lack of spontaneity, offered a field for investigation with dinitrophenol. Twelve female patients of the hebephrenic type were used for the purposes of investigation, and while they were under treatment records were made of variations in weight and determinations were made every two to four days of their oxygen consumption rate. The period of treatment by dinitrophenol lasted from thirty to sixty days. Dosage commenced at 100 milligrammes per day in divided doses, and this was gradually increased to 270 milligrammes per day. The dose of the sodium dinitrophenol was not increased to the maximum if the weight loss was rapid in smaller doses. A typical case is reported in detail in which the oxygen consumption rate prior to medication was +12. In two weeks under dinitrophenol this increased to +26; in a further fortnight it was +33, and at the end of forty days it was +60. Mental improvement was manifested by increased sociability and greater interest in occupational therapy. In general the average oxygen consumption rate reached +37·16, and the average loss of weight was 0·64 kilogram (1·44 pounds) per week. The non-protein nitrogen was increased and the blood cholesterol decreased during treatment. Oxygen consumption rate returned to normal when the drug was withdrawn; and five of the twelve patients improved mentally.

Vegetative Disturbances of Cerebral Origin.

JOSEPH H. GLOBUS (*New York State Journal of Medicine*, February 1, 1935) presents eight clinical cases demonstrating vegetative disturbances of cerebral origin, prefaced by an anatomical sketch of the diencephalon. In each of these cases a lesion in the diencephalo-hypophyseal region was diagnosed. In a girl of six a tumour involving the posterior lobe of the pituitary body and encroaching upon the right *crus cerebri* was responsible for the symptoms of diabetes. Polyuria and vomiting combined with primary optic atrophy on the left side and other neurological signs were brought about in a boy of three and a half years by a cyst of Rathke's pouch. Other cases showing anomalous fat distribution, disturbances in water balance, alteration in primary and secondary sexual functions, disturbances in heat regulation, intestinal peristalsis, sleep and appetite, are quoted with opulent neurologic data and pathological autopsy findings, the lesion in all cases involving structures in the diencephalon. This author claims that the clinical material and pathological findings presented in this paper would seem to substantiate the view held with regard to the hypothalamus, that it serves as an important centre controlling the interacting vegetative functions.

Syphilis and Subnormality.

MATTHEW MOLITCH AND AUGUST K. ECCLES (*The Journal of Nervous and Mental Diseases*, March, 1935) consider the question of mental level and syphilis in relation to juvenile delinquency. One hundred and sixteen boys were examined. It was assumed that the syphilitic infection was congenital in the majority of cases. An examination of the cerebro-spinal fluid was carried out in forty-one of these cases, and in all but one, that of a juvenile general paretic, no abnormality was found. Mental levels were worked out by a number of the standard methods for psychological testing. Among the non-luetic delinquents 27% were found to have average normal intelligence, 48% were grouped as inferior normal, and 25% were definitely classified as subnormal. Among the luetic delinquents, only 21% were found to possess average normal intelligence, while 36% were inferior normal, and 43% were definitely subnormal. The incidence of mental subnormality among the luetics was therefore found to be almost double that of the non-luetic delinquents; and the writers point out that these boys did not offer adjustment problems and did not show peculiarities of behaviour as, for instance, is seen in post-encephalitic cases. A case of juvenile general paresis is reported in detail and with psychological findings.

British Medical Association News.

SCIENTIFIC.

A MEETING OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION, IN CONJUNCTION WITH THE MELBOURNE PÆDIATRIC SOCIETY, was held at the Children's Hospital, Carlton, on October 17, 1934. The meeting took the form of a series of clinical demonstrations.

Pink Disease.

DR. J. W. GRIEVE showed a male child, aged ten and a half months, with pink disease. Dr. Grieve said that this patient's history was typical and was a good example of the various stages of the disease, for there was a history of primary symptoms, cough *et cetera*, followed by a quiescent period of a few days, and then secondary symptoms characteristic of the fully developed disease. The child was now convalescent and had made no definite response to any method of treatment. The blood calcium content had been estimated at 11·4 milligrammes per 100 cubic centimetres; the blood count was normal; Wassermann reaction was absent; the erythrocyte sedimentation rate and the cerebro-spinal fluid were normal.

The patient was shown as a typical example of pink disease, and illustrated its usual progress and the lack of response to any special method of treatment, such as the addition of vitamin *B* and liver feeding.

Rickets.

Dr. Grieve's second patient was a boy, aged six and a half years, with advanced rickets. His dietetic history was of interest. Up to the age of eighteen months his progress was normal; then he contracted severe bronchopneumonia. Following this there was a great deal of difficulty with his feeding, so that his mother took over his control and kept him on "Bengerized" milk for six months and then boiled milk and biscuits until admission to hospital at the age of six and a half years. The reason she gave for this was that he would not take other foods.

When the boy was three and a half years old the mother noticed that his limbs were deformed. This deformity continued. He had never talked properly and was backward. Four teeth (molars) only were present.

Skeletal changes were typical of advanced rickets and were associated with marked bowing of the tibia and fibula. There was also a most marked rickety rosary. X ray examination of the bones confirmed the clinical findings. His mental testing showed a mental age of between two and four years. The blood calcium content was 11·5 milligrammes per 100 cubic centimetres; the blood phosphorus content was 3·2 milligrammes, and the blood urea content 23 milligrammes per 100 cubic centimetres. There was no reaction to the Wassermann test. Treatment was along the ordinary lines.

Dr. Grieve said that he was particularly interested in the mental retardation of the boy, and wondered how much was due to his rickets.

Oxycephaly.

Dr. Grieve's next patient was a girl, aged nineteen years, suffering from oxycephaly associated with secondary optic atrophy. Dr. Grieve pointed out the typical characteristics of the disorder: wide transverse diameter of the skull, narrow antero-posterior diameter, and the high steeple type of skull. The poor development of the maxillæ and the exophthalmos were well shown. Ophthalmological examination revealed optic atrophy in both eyes, changes that had been known to exist for many years. She was completely blind in the left eye, but the visual acuity was estimated at $^6/_6$ in the right eye. Skiagrams of the skull revealed convolutional markings, the absence of the inner table of the skull, overgrowth of the great wing of the sphenoid, rudimentary nasal sinuses, and the absence of sutures.

Scaphocephaly.

Dr. Grieve also showed photographs of a patient with scaphocephaly, in which there was mental retardation and the typical keel-shaped forehead associated with this condition. Dr. Grieve pointed out that in this condition there was also a tendency to fœtal synostosis of the facio-cranial bones, as in oxycephaly, but that instead of overgrowth of the greater wings of the sphenoid there was under-development, with resultant narrowing of the transverse diameter and an increase in the antero-posterior diameter and height of the skull.

Hypertelorism.

Dr. Grieve's last patient suffered from hypertelorism. In the photographs of this patient could be seen the characteristic wide spacing of the eyes, with a tendency to divergence of their axes, and a pushing forwards, upwards and outwards of the frontal bone. Dr. Grieve pointed out that in this condition the underlying deformity was an over-development of the lesser wings of the sphenoid; in this condition there was not the same tendency for synostosis of the facio-cranial bones.

Infant Feeding.

DR. H. BOYD GRAHAM arranged a display of charts to illustrate a number of features of interest in connexion with caloric feeding of infants.

Dr. Graham pointed out that the first chart contained a complete record of the amount, nature and daily caloric value of all the food taken by an infant from the age of three weeks to the age of nine months. The baby had made normal average weight progress, and as the daily total caloric intake and the weight (taken twice a week) were charted to scale so that an intake of 50 calories per pound would correspond with the weight line, it was apparent at a glance that up to the age of three months the baby had taken about 50 calories per pound, and that, as the baby had grown older, the food requirement had gradually fallen below this value. These deductions were valid, because for the first three months the baby had been fed at the breast, and as soon as the weight line had shown a slight depression, complementary feeding had been initiated, the amount taken having been according to the appetite of the baby. This principle of "appetite feeding" had been continued throughout the period under review.

Another chart showed the weight progress of twin female babies of the same birth weight and the same weight at three months of age, at which point a commencement was made with a feeding experiment. Each baby was given one-half of a feeding calculated as sufficient to cover the theoretical requirements of them both. In three weeks it was found that one baby had gained more weight than the other, and thereafter the heavier one gained more and more than the lighter one, although both babies were fed on the basis of the theoretical requirement of the lighter one. Dr. Graham said that at a glance it could be seen that the heavier baby was much less active than the other, and this difference in activity explained the apparent anomaly in weight progress. Both babies made satisfactory progress, and neither baby refused any food offered or vomited any of it.

The charts of three other babies illustrated the fact that, when considered necessary, the preliminary weight loss after birth could be minimized or avoided by the giving of appropriate amounts of food that had been made especially easy of digestion for infants of such an early age.

Several other charts demonstrated the futility of attempting to estimate the daily intake of breast milk based on a few isolated test feeding figures.

DR. IAN WOOD gave a practical demonstration of the various methods of administering fluids to infants. Life-sized dolls were converted into working models, fine rubber tubing being used to represent the veins. In Table I some of the salient features of the display are summarized.

TABLE I.

Administration of Fluid to Infants.

Method.	Fluid.	Volume.	Frequency.	Indication.
Pipette	Milk mixture (high caloric value)	As indicated	Every two or three hours	Prematurity
Œsophageal tube	Milk mixture (high caloric value)	Usual volume or more	Every four to six hours	Prematurity. Very ill infants (pneumonia)
Rectal	Saline solution	60 to 300 cubic centimetres (2 to 10 ounces)	Continuous or every six hours	Dehydration without diarrhœa
Subcutaneous	Saline solution	150 to 300 cubic centimetres (5 to 10 ounces)	Every six hours	Any dehydration
Intraperitoneal	Saline solution	150 to 300 cubic centimetres (5 to 10 ounces)	Every twelve hours	Dehydration (not if *in extremis*, owing to shock)
Intravenous, intermittent	5% glucose in saline solution or blood	Glucose, saline solution, 33 cubic centimetres per kilogram (half ounce per pound); blood, 22 cubic centimetres per kilogram (one-third of an ounce per pound) body weight	Every twelve hours	Dehydration, exsanguination
Intravenous, continuous	2% glucose in saline solution (? blood every 12 hours)	30 to 90 cubic centimetres (1 to 3 ounces) an hour	Every day or two or three days	Severe dehydration (diarrhœa, acidosis, diabetes, peritonitis)

Syphilis.

DR. CHARLES OSBORN and DR. ERIC PRICE showed a female patient, aged two months, suffering from syphilitic epiphysitis. The epiphyses of the right elbow and right knee were swollen and painful on movement; but there was radiological evidence in the left elbow and knee and both wrists as well. There was rarefaction in the metaphyseal regions, with erosion of cortical bone and a periosteal reaction. There were no other stigmata, the child being otherwise healthy. The mother was under treatment for subclinical syphilis.

Congenital Dislocation of the Hip.

Dr. Osborn and Dr. Price also showed a female, aged two years and three months, to illustrate the clinical signs of congenital dislocation of the left hip. The patient succeeded in walking at eighteen months after much persuasion, and then was noticed to limp with a lurch to the left side. There was shortening of 2·5 centimetres (one inch), with typical displacement of the femoral head and telescoping. X ray examination revealed a small capital epiphysis and deficient acetabular roof, with the head displaced on the *dorsum ilii*.

Osteomyelitis.

Dr. Osborn and Dr. Price next showed a male patient, aged seven years, suffering from osteomyelitis of the femoral neck of unusual chronicity. Eleven months previously, seven weeks after an attack of impetigo and adenitis, pain, swelling and tenderness had occurred in the region of the right *trochanter major* and adjoining femoral shaft. The hip was free and he was not very ill. X ray examination at the time showed irregular absorption with periosteum raised from the shaft. The limb was put in a plaster spica for six months. At the end of this time X ray examination showed a walling off of the process with condensed bone and the extrusion of two small sequestra into the soft tissues; the patient was allowed movement at first in bed and later on crutches.

One month before the meeting, after four months' freedom from plaster, an abscess appeared behind the trochanter. This was incised; it had healed before the time of the meeting. *Staphylococcus aureus* was cultured from the pus.

At the time of the meeting hip movement was about 75% of normal, external rotation especially being limited, while the knee could be flexed to 130°. The patient was not yet bearing weight.

Osteochondritis.

Dr. Osborn and Dr. Price also showed a boy, aged thirteen years, suffering from osteochondritis of the occasional epiphysis for the tibial tuberosity. Following a blow one month previously the right knee had become stiff and the region painful, so that he walked with a limp. Examination showed a tender thickening at the insertion of the *ligamentum patellæ*; X ray examination showed irregular areas of rarefaction in the epiphysis. Flexion of the knee was prevented for seven weeks by means of a posterior plaster slab, and recovery occurred; but symptoms had now commenced in the opposite epiphysis, which was similar clinically; radiologically there was a more typical fragmentation.

Tuberculous Osteitis.

The next patient shown by Dr. Osborn and Dr. Price was a girl, aged nine years, suffering from localized tuberculous osteitis of the left femoral neck. Four years previously the patient, then aged five years, had pain in the left hip, which fixed by spasm in flexion, abduction and external rotation. She was observed for one month. During this time she had a daily rise of temperature to 37·3° C. (99·2° F.). The von Pirquet test gave a reaction; there was a family history of tuberculosis, and the hip did not improve. X ray examination revealed no abnormality, but the condition was regarded as an early tuberculous coxitis, and plaster was applied. One year and nine months later X ray examination showed a localized area in the under side of the femoral neck, which was irregularly mottled and limited by a thin layer of condensed bone. This was accepted as a tuberculous focus. The hip movement was now painless, though restricted to about 50° of normal range.

For the next six months she walked on crutches, wearing a light spica; since then she had used crutches only. In this period the focus steadily recalcified; but a suspicious area appeared in the roof of the acetabulum. The last X ray examination (on October 4, 1934) showed a diminution of cartilage, still some rarefaction in the neck, with a small clear area in the acetabulum near the triradiate

cartilage. Hip movement was good (90° of flexion, 30° of abduction and 45° of rotation).

Opinions differed on this case. Dr. Colin Macdonald accepted it as a tuberculous arthritis, but thought that the appearance of the femoral neck was due to rotation of the limb. It was also suggested that the case might be an atypical Perthes's disease. Against this it was pointed out that the head of the bone was somewhat rotated outwards, but had never been fragmented, and was not noticeably flattened.

Arthrogryphosis Multiplex Congenita.

The last patient shown by Dr. Osborn and Dr. Price was a male, aged one and a half years, suffering from *arthrogryphosis multiplex congenita*. At birth he had an extreme and rigid *talipes equinovarus*, with splayed and flexed toes, thin legs and flexed knees. The upper limbs were normal. He was treated by weekly manipulations and strapping retention. The knees were now straight; but the talipedic deformity needed much further treatment.

NOMINATIONS AND ELECTIONS.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Ward, Hugh Kingsley, M.B., 1910 (Univ. Sydney), University of Sydney, Camperdown.

Medical Societies.

MELBOURNE PÆDIATRIC SOCIETY.

A MEETING OF THE MELBOURNE PÆDIATRIC SOCIETY was held at the Children's Hospital, Carlton, on May 8, 1935, DR. J. G. WHITAKER, the President, in the chair. The meeting took the form of a series of clinical demonstrations.

Sporadic Cretinism.

DR. H. BOYD GRAHAM showed a baby of nine months whom he had first seen at the age of five months. The child was born at full term and its birth weight was 4·05 kilograms (nine pounds). It was the sixth child of the family. The mother, father and five other children were all normal. The mother brought this child to hospital when it was five months old because it seemed to be backward and had a hoarse, feeble cry. The child furnished a typical example of sporadic cretinism, and had a receding forehead, a tough cyanotic skin, a gaping tongue too big for its mouth, an umbilical hernia, and a hoarse cry. At six months of age the child weighed only 5·09 kilograms (eleven pounds five ounces), and the head circumference was 40·3 centimetres (sixteen and one-eighth inches). At the commencement of treatment he gave the child 0·015 gramme (one-quarter of a grain) of dried thyreoid gland daily, and even after a fortnight there was distinct improvement. He then increased the dose to 0·015 gramme twice a day. From then on there had been steady improvement; the weight had regularly increased, the head circumference increased, the child could now hold its head up, the skin was softer, and the cry more like that of a normal child. Dr. Graham showed the patient because, although sporadic cretinism was a well defined and easily recognizable entity, lesser degrees of it could easily be overlooked. The response to treatment was very gratifying.

Replying to criticism by Dr. Ian Wood that the dosage of thyreoid was too small, Dr. Graham said the child was receiving 0·03 gramme (half a grain) of *Thyroideum Siccum* per day, which was equivalent to 0·15 gramme (two and a half grains) of thyreoid extract. He himself intended to increase the dose, but he thought caution was necessary to avoid giving an overdosage.

Amyotrophic Lateral Sclerosis.

Dr. Graham next showed a girl of eight and a half years, admitted to hospital one month previously. There were three other children in the family, all alive and well. The child had been born at full term, weighing 4·5 kilograms (ten pounds). It had been a forceps delivery and the face and head were said to have been bruised. The teeth began to erupt at four months; she walked and talked at one year, and generally seemed to progress quite normally till the age of six years, when she commenced school, and it was noticed that she walked with a stiff right leg. One month later the right arm became weak and limp. This condition apparently progressed steadily until a month ago, when she became unable to walk, even with support. On admission to hospital she was found to be an irritable child with a flaccid paralysis of both arms, more marked on the right side, and with a spastic paralysis of the legs, also more marked on the right side. There was nystagmus, especially on looking to the right, and some weakness of the right side of the face. There was also a partial paralysis of the right third cranial nerve. The deep reflexes in the upper limbs were absent and the lower limbs revealed all the associated signs of pyramidal involvement, such as bilateral Babinski's sign, ankle clonus and rigidity. The child's mentality did not permit of an adequate sensory examination, but it appeared to be normal and she could appreciate heat and cold sufficiently to exclude dissociated anæsthesia. There were no fibrillary tremors. There was slight wasting of the right side of the face and slight right-sided ptosis. There was no papilloedema. The patient's cerebro-spinal fluid was normal in all respects, microscopic and chemical; and radiograms of the skull and spine revealed no abnormality. The blood Wassermann test also gave no reaction.

Dr. Graham said that the clinical picture was essentially that of a progressive paralysis, commencing with flaccid paralysis of the arms, spastic paralysis of the legs and, later, cranial nerve and bulbar involvement, so that, despite the youth of the child, he thought amyotrophic lateral sclerosis was the most likely diagnosis. Polioencephalitis had been suggested, but the steady progress and the mental deterioration were against this. Syringomyelia was excluded by the absence of dissociated anæsthesia.

Extroversion of the Bladder.

DR. H. DOUGLAS STEPHENS showed a baby girl of two months with extroversion of the bladder. The child had been born two weeks prematurely, but was otherwise quite normal. There was one other child, but both it and the parents were normal. In this case the extroversion was complete and there was in addition a patulous anus and a rectal prolapse. Instead of the pubic symphysis there was a transverse fibrous band connecting the bodies of the pubes. The umbilicus was situated at the top of the bladder. Dr. Stephens said he did not propose to do anything to the child until it was at least three years of age, when he proposed to do Coffey's operation of intraperitoneal transplantation of the ureters into the colon. He thought it better to do the operation in two stages and not to use catheters at the time of transplantation because of the risk of infection and sloughing. He showed the case chiefly as a rare abnormality of childhood.

Bilateral Tuberculosis of the Knees.

DR. J. G. WHITAKER showed a child of three years, admitted to hospital a year ago with bilateral tuberculosis of the knee joints and then transferred to the Frankston Orthopædic Hospital, where the legs were put in plaster in full extension and slight abduction at the hip joints. The child had been treated conservatively for a year. The first radiogram taken on admission to hospital showed much destruction of the knee joints, particularly of the femoral epiphyses, but serial radiograms taken since showed progressive subluxation of both knees, which was not present when the child was first treated. The Mantoux test gave a positive reaction, but the sedimentation rate of the red blood corpuscles had been normal throughout. The mother of the child had died of pulmonary tuberculosis.

The reasons Dr. Whitaker showed the case were, first, that the child was very young to have bilateral tuberculosis of the knees and, secondly, that this bad result of conservative treatment was very common in his experience.

He had seven other cases of joint tuberculosis of hips and elbows, and they had all progressed with conservative treatment. In older children he thought arthrodesis was worthy of trial, but in cases such as this one, he frankly did not know what to do. The tendency was for knees to subluxate and for hips to develop a posterior pathological dislocation. He thought in general that early cases of joint tuberculosis tending to progress with conservative treatment should be fixed.

Cephalhæmatoma.

DR. W. W. MCLAREN showed a baby girl, aged one year and one month, with a history that immediately after birth a lump was felt over the right parietal bone near the vertex. At the age of one month she began to have convulsions, which have recurred at intervals, but more often recently. She had been a full-time baby, delivered with forceps, and the face was said to have been bruised. The tumour was fixed, very hard and had not increased in size. A radiogram, taken on admission, revealed what was thought to be a calcified hæmatoma of the skull. All other relevant investigations revealed no abnormality. However, a second radiogram showed that the tumour had increased in size, and it was now thought to be an osteoma.

DR. H. D. STEPHENS said he had seen many such cases as this one. Despite the increase in size, he still thought it was a cephalhæmatoma. Many of them, although feeling hard, were cystic. He would be inclined to wait longer, but, if it still progressed, he would advise lifting the outer table of the skull, scraping the tumour and replacing the bone.

Correspondence.

A SURVEY OF MUSSELS ON THE AUSTRALIAN COAST.

SIR: Miss Joyce Allan, assistant conchologist of the Australian Museum, Sydney, has kindly drawn my attention to an error in identification of a species of mussel described in my paper, "A Survey of Mussels on a Portion of the Australian Coast", which appeared in THE MEDICAL JOURNAL OF AUSTRALIA, April 20, 1935.

The species described as *Modiolus australis* should read *Trichomya* (*Brachyodontes*) *hirsuta*.

Yours, etc.,
D. H. LE MESSURIER.

The Walter and Eliza Hall Institute of Research in Pathology and Medicine,
Melbourne,
May 23, 1935.

THE "CHEST" PHYSICIAN AND THE RADIOLOGIST.

SIR: I would like to thank your correspondents, Dr. F. J. Gwynne and Dr. J. G. Edwards, for their comments on my letter (THE MEDICAL JOURNAL OF AUSTRALIA, March 30, 1935) and briefly reply.

That the radiologist frequently receives inadequate clinical notes is unfortunately but bare fact—the out-patient department of a busy hospital is not an ideal place for clinical observation. Sometimes, because of brevity, the notes may be actually misleading. But does the radiologist require any clinical notes? His report is an expression of opinion, not on a patient, but on an X ray plate. I trust I will be pardoned for reiterating that it is the function of the physician, to whom the report is supplied, to correlate it with the history, clinical examination and results of pathological tests. (A report of a fluoroscopic examination conveys but little to other than the actual observer; the physician should, if possible, view the screening with the radiologist.) I do not suggest that full clinical notes should not be supplied, even if only to make the life of the radiologist reasonably interesting; but the notes should not form the basis of the report.

It has been advocated by some that ordinary clinical methods are obsolete; but what is radiology other than an additional clinical method? The admission that "the radiologist is often expected to give information his method can never give" merely serves to emphasize that specialists, like other mortals, must resist temptation.

My "translation" of the first of the two reports quoted would read somewhat thus: "Pleural effusion at the right base, obscuring details of the corresponding portion of the lung; remainder of the right lung, and whole of left lung are clear." Should our physician be at all alert, he will probably have heard it whispered in the halls of learning that pleurisy with effusion is not infrequently tuberculous in origin.

The translation of the second report is, I confess, beyond me.

No one doubts the value of expert opinion on any examination, radiological or otherwise; and good team work is probably the most satisfactory. It was with the desire of emphasizing the need for caution in reporting on chest radiographs that the subject was opened.

Might I, with due reference to Dr. Edwards, remark that the fate of Agag suggests that his optimism was entirely without justification. But his interest was in major surgery!

Yours, etc.,
". . . ANGELS FEAR TO TREAD."

Melbourne,
May 27, 1935.

THE MORTALITY OF APPENDICITIS.

SIR: Dr. J. Colvin Storey, in his article in the journal (May 25, 1935), makes a serious attack on a method of anæsthesia that I feel confident in saying is used almost universally by medical practitioners outside the large metropolitan hospitals.

He states: "I know by experience that ethyl chloride followed by ether is a dangerous sequence and simply will not allow its use." Would Dr. Storey kindly give chapter and verse on which he bases this statement? I am sure it will be a great surprise to most of us.

Although my own use of this form of anæsthesia cannot be called extensive, I have used the method, I should say, several thousand times without experiencing one moment's anxiety, although I will admit when I first used the method there were a few cases which developed a spasm of the glottis, and others convulsive general spasms; but I can say that this has not happened of late years. I attributed this condition to not getting the patient sufficiently deeply under with ethyl chloride before switching on to open ether, and having insured a good ethyl chloride anæsthesia before the change there have been no adverse happenings.

The patient certainly enjoys the speedy, not unpleasant odour of ethyl chloride, especially when flavoured with eau-de-Cologne or boronia ("Ethyl Borone"), compared with the long-drawn-out induction with the pungent fumes of straight ether.

I have presumed that Dr. Storey referred to the open method of administration and not to closed methods, on which may small experience many years ago, when a resident medical officer, would not qualify me to speak.

Yours, etc.,
S. SHINEBERG.

Bingara,
New South Wales,
May 28, 1935.

Medical Prizes.

THE GIFFORD EDMONDS PRIZE.

THE Gifford Edmonds Prize in Ophthalmology, presented every two years by the Royal London Ophthalmic Hospital (Moorefields Eye Hospital), has been awarded to Dr. T. a'B. Travers for his essay entitled "A Comparison between the Visual Results obtained by the Various Methods Employed for the Treatment of Concomitant Strabismus".

THE GEORGE MACDONALD TESTIMONIAL FUND.

THE undermentioned subscriptions have been received for the George Macdonald Testimonial Fund:

£2 2s.: Dr. A. Watson Munro.
£1 3s.: Department of Physiology, University of Sydney.
£1 1s.: Dr. A. H. Macintosh, Dr. F. P. Sandes, Dr. J. Hoets, Mr. H. M. Green.
£1: Dr. O. Latham.

Books Received.

THE PATIENT AND THE WEATHER; Volume II, Autonomic Dysintegration, by William F. Petersen, M.D., with the assistance of Margaret E. Milliken, S.M.; 1934. Michigan: Edwards Brothers, Incorporated. Imperial 8vo., pp. 530. Price: $6.50.

Diary for the Month.

JUNE 15.—Victorian Branch, B.M.A.: Branch.
JUNE 18.—Tasmanian Branch, B.M.A.: Council.
JUNE 18.—New South Wales Branch, B.M.A.: Ethics Committee.
JUNE 19.—Victorian Branch, B.M.A.: Clinical Meeting.
JUNE 19.—Western Australian Branch, B.M.A.: Branch.
JUNE 20.—New South Wales Branch, B.M.A.: Clinical Meeting.
JUNE 25.—New South Wales Branch, B.M.A.: Medical Politics Committee.
JUNE 27.—South Australian Branch, B.M.A.: Branch.
JUNE 27.—New South Wales Branch, B.M.A.: Branch.
JUNE 28.—Queensland Branch, B.M.A.: Council.

Medical Appointments.

Dr. G. E. Aitken has been appointed Deputy Superintendent, Parkside Mental Hospital, and Deputy Superintendent, Hospital for Criminal Mental Defectives, South Australia.

* * *

Dr. A. J. Hakendorf (B.M.A.) and Dr. V. de P. L. Rice have been appointed Honorary Anæsthetists in the Adelaide Hospital, South Australia.

* * *

Dr. A. M. Cudmore (B.M.A.) has been appointed a Member of the Adelaide Hospital Advisory Committee, under the provisions of the *Hospitals Act Amendment Act*, 1921, South Australia.

* * *

Sir Raphael Cilento (B.M.A.) and Dr. V. McDowall (B.M.A.) have been appointed members of a board, to be called "The X Ray and Other Electro-Medical Equipment Advisory Board", Queensland.

* * *

Dr. K. C. O'Hanlon (B.M.A.) has been appointed Government Medical Officer at Quirindi, New South Wales.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," pages xvi, xvii. and xix.

CHILDREN'S HOSPITAL (INCORPORATED), PERTH, WESTERN AUSTRALIA: Junior Resident Medical Officers.
LAUNCESTON PUBLIC HOSPITAL, LAUNCESTON, TASMANIA: Resident Medical Officers.
PRINCE HENRY HOSPITAL, SYDNEY, NEW SOUTH WALES: Junior Resident Medical Officers.
REPATRIATION COMMISSION, SYDNEY, NEW SOUTH WALES: Medical Officer.
ROYAL MELBOURNE HOSPITAL, MELBOURNE, VICTORIA: Honorary Surgeon.
ROYAL PRINCE ALFRED HOSPITAL, SYDNEY, NEW SOUTH WALES: Honorary Officers.
ST. GEORGE DISTRICT HOSPITAL, KOGARAH, NEW SOUTH WALES: Senior Resident Medical Officer.
ST. VINCENT'S HOSPITAL, MELBOURNE, VICTORIA: Honorary Officers.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane Associate Friendly Societies' Medical Institute. Chillagoe Hospital. Members accepting LODGE appointment and those desiring to accept appointments to any COUNTRY HOSPITAL, are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	Officer of Health, District Council of Elliston. All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Editorial Notices.

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